END-USERS' EXPERIENCES WITH ED-TECH PROCUREMENT PRACTICES

by

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Abstract

Globally, the ed-tech movement is a $13 billion-dollar industry, with venture companies and startup accelerator programs spreading across the country (FutureSource Consulting, 2014). Despite their promise to redefine education, many products are procured without the input and involvement of end-users (e.g., principals, teachers, and students) of such technology products (Ainsworth, 2006; Jayroe & Brenner, 2002; Morrison, Ross, Corcoran, & Reid, 2014; Morrison, Ross, & Corcoran, 2015). Through a literature review of ed-tech procurement practices and end-user involvement as well as a needs assessment examining these issues within a large public school district, a lack of knowledge of proper procurement and end-user involvement was discovered. Using Rogers' (2003) diffusion of innovation as a theoretical framework, an intervention was developed to increase end-users' involvement and knowledge of procurement practices, with specific emphasis on conducting needs assessments. The intervention included a three-chapter end-user guide and three corresponding professional development sessions. Through a mixed methodological approach, the impact of the intervention components on end-user involvement and knowledge of procurement practices were examined. A pretest and posttest analysis of end-user involvement found statistically significant increases in end-user knowledge of procurement strategies and increases in likelihood of involvement in and favorable perceptions of needs assessments. Qualitative data from individual interviews supported quantitative trends and revealed high satisfaction with the intervention and an increased likelihood of requesting involvement in procurement practices in the future.

Keywords: ed-tech procurement, needs assessments, diffusion of innovations

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Dedication

This dissertation is dedicated to some of the most important people in my life who provided support through this process. To my beautiful bride, Rachel, who entered into this journey with me just weeks after our first child, Noah, was born. Through the past three years she has supported me in every facet of life from parenting, to thought-partner, to supporting our everyday life as I studied and wrote. To our first born, Noah, who provided me with endless hours of reasons not to study. I'm so happy to complete this phase of my life so that I can spend much more time with you. To my second born, Landon, whose birth gave me the energy and reason to finish up the writing phase of this dissertation so that I could spend every moment with my little family. To my mother and father, Curt and Crystal, who provided me with a solid foundation both socially, intellectually, and financially to enter into this journey. To my little brother, Jake, who frankly beat me to the doctor status. I'm excited to be joining you soon. Finally, to my mother-in-law and father-in-law, Ed and Anna, who drove to Winston-Salem countless times to provide endless hours of baby-sitting and help around the house as I worked, studied, and finished this dissertation.

Acknowledgements

Over the past three years, my experiences within this program have caused me to grow both academically and professionally. I fondly recall my first visit to campus and meeting my fellow peers. I remember learning quickly that the expectation of academic rigor was set high. Through the years, those expectations came to fruition to my benefit, as I enter the next phases of my professional career I feel prepared to lead in the complex space of public education in the United States.

I also recall crafting my application for admission and considering a dissertation topic I would enjoy learning about but more importantly becoming an expert within the field. The world of ed-tech had always fascinated me, but also frustrated me because I always felt educators didn't have enough weight in the procurement process. As I reviewed the literature to write my application essay, I repeatedly stumbled upon a name - Dr. Jennifer Morrison. I enjoyed reading her work on ed-tech procurement and wondered what the possibility might be that I could learn from one of the only researchers who has studied ed-tech procurement in public education. From the moment I called to inquire about the possibility of being my advisor, she has been the most supportive, responsive, and caring faculty member I've met at Johns Hopkins University. Over the years, I have been extremely appreciative of the endless hours of conversations and feedback she has provided me. She has clearly made me a better scholar and professional. Dr. Steven Ross has provided me with a true respect for "less is more" and learning to write in a manner that is clear and concise, which is much harder than it appears. Further, his work in needs assessments and ed-tech procurement are woven through the foundational elements of this dissertation. Finally, my boss, mentor, and committee member, Dr. Lynn Moody, has provided me with much insight about the dissertation process throughout the years. Although the dissertation and course work has been highly academic, she has always found ways of applying

that knowledge in practice. Further, she has kept me grounded and focused on elements of my life that, quite frankly, became lost in all the work associated with this degree. I am appreciative of her support in every facet of my life but especially thankful for her willingness to help me learn and grow professionally.

I would be remiss if I didn't mention a special mentor who started my trajectory in the ed-tech space - Dr. Ann Cunningham. As an undergraduate at Wake Forest University she taught my instructional design, technology, and assessment course that initially peaked my interest in the use of technology in the classroom. It was under her direction and support that I gave my first presentation to a conference audience on the use of ed-tech in schools. Over the past decade she's been a constant supporter of my work. I attribute much of my professional career to her impact on my academic passions.

Finally, I am grateful to the support of my cohort peers who made the journey alongside me. From residencies, to the Facebook group, to backchannel communication during Adobe Connect synchronous meetings, you guys made life fun and the work manageable. I hope our academic careers foster lasting professional and personal relationships.

Table of Contents

List of Tables

List of Figures

Executive Summary

Classrooms around the world are evolving as technology influences the way students learn and educators teach. As technology usage has increased outside the classroom, educational technology (ed-tech) companies have capitalized on technology's ability to personalize learning experiences for students (Hodas, 2016; Lee, 2008). These personalized learning experiences result in content that is layered with support mechanisms that solve for differences in student learners. Digital technologies also allow for flexible and adaptive delivery of content so that learners are met at their individualized level. The capabilities of technology to reach all learns has caused schools across the nation to acquire digital resources at accelerated rates (FutureSource Consulting, 2014).

Globally, the ed-tech movement is a $13 billion-dollar industry, with venture companies and startup accelerator programs spreading across the country (FutureSource Consulting, 2014). However, because of the rapidly expanding field of ed-tech, little is known about the effectiveness of individual applications and programs (Honig & Coburn, 2008). Many ed-tech companies find it difficult to provide the empirical data and evidence needed to convince school district leaders of their product's educational merit (Morrison et al., 2015). Educators are therefore left to integrate ed-tech tools with little input on their design, selection, and evaluation (Maas & Lake, 2015). Furthermore, end-users (e.g., principals, teachers, and students) of such technology products are often absent in many phases of the procurement process (Ainsworth, 2006; Jayroe & Brenner, 2002; Morrison et al., 2014; Morrison et al., 2015). Teacher involvement in procurement has important implications in efficacy and usage of digital resources.

Literature Review

To determine contributing factors associated with the Problem of Practice, a literature

review was conducted on the current ed-tech procurement practices in public education. Through the literature review, several themes emerged. First, current ed-tech procurement practices are outdated and match older textbook adoption models (Digital Promise, 2014; Kinshuk, Huang, Sampson, & Chen, 2013; Kozma, 2011, Jayroe & Brenner, 2002; Maas & Lake, 2015). The impact of historical and antiquated procurement practices has resulted in practices that do not match the needs of end-users and modernized ed-tech market trends (Bailey, Owens, Schneider, Vander Ark & Waldron 2015; Hommen & Rolfstam, 2009; Morrison et al., 2014; Morrison et al., 2015).

Second, needs assessments are rarely formally conducted before searching for new ed-tech tools (Jayroe & Brenner, 2002; Morrison et al., 2014; Morrison et al., 2015). The lack of formal needs assessment practices may result in products purchased not based on the needs of students, rather the perception of what is needed by administrators. Ultimately, administrators often have difficulty deciding what product is best because of inherent sale person distrust and distrust in data provided by companies supporting product effectiveness (Darke & Ritchie, 2007; Jolson, 1970; Jolson, 1972; McMurray 1961).

Third, the formation of partnerships and subsequent interactions between buyer and supplier are essential in the discovery of new ed-tech products (Ainsworth, 2006; Grudinschi, Sintonen, & Hillikas, 2014; Marion, Eddleston, Friar, and Deeds (2015); Smith & Humberstone, 2015). However, because procurement practices do not always include frequent communication channels with vendors and end-users, discovery of new tools is often difficult (Ainsworth, 2006; Kalou & Sadler-Smith, 2015). Furthermore, time has become a factor in the discovery phase of procurement (Bailey et al., 2015), further delaying the implementation of ed-tech products to support end-users' needs.

Fourth, districts and schools place little emphasis on thorough product evaluation. This is

likely due to perceived time constraints, quick purchasing timelines, and a lack of measurable outcomes. This practice is driven by the fact that buyers of ed-tech products are not users of the products and a lack of rigorous evidence demonstrating product effectiveness (Bailey et al., 2015). Therefore, products are purchased without properly vetting the effectiveness and usefulness with end-users (Bailey et al., 2015; Digital Promise, 2014; Jayroe & Brenner, 2002; Morrison et al., 2014; Morrison et al., 2015). The lack of end-user involvement often leads to the acquisition of products that are not used by end-users or leveraged fully (Bailey et al., 2015; Sugar, Crawley, & Fine, 2004; Teo, 2011). Furthermore, data to provide empirical evidence of product effectiveness are rarely available from vendors (Jayroe & Brenner, 2002; Honig, 2004; Levin & Schrum, 2013b).

Fifth, end-users are rarely involved in needs assessments and product evaluation. It has been suggested that all end-user groups (teachers and students) and those associated with end-users (administrators, instructional support staff, parents) be a part of a comprehensive needs assessment (Fabry & Higgs, 1997). While research has documented the positive impact of teacher involvement in procurement practices, many times end-users are left out of the procurement process (Jayroe & Brenner, 2002; Morrison et al., 2015). The inclusion of teachers, who are likely to understand student needs most in procurement practices, is essential to ensuring that ed-tech purchases closely align to the learning needs of students.

After reviewing available research identifying the experiences of administrators in ed-tech procurement, (Morrison et al., 2014; Morrison et al., 2015), it is clear that gaps in recent research still exist surrounding the involvement of end-users (educators). While studies have studied ed-tech procurement from the administrator perspective, no studies have examined how end-users' experience with procurement. The needs assessment in chapter two provided additional insight in teacher and school-level administrator involvement through three major

focus areas of procurement: (a) needs assessments to validate purchasing new products, (b) discovery of new products, and (c) selection/evaluation of new products.

Needs Assessment

Through a literature review of procurement practices in schools, overarching themes emerged including (a) historical and antiquated procurement practices, (b) a lack of needs assessments for new products, (c) barriers to discovering new ed-tech products, (d) little emphasis on product evaluation, and (e) a lack of end-user involvement in needs assessments and product evaluation. Although the literature review revealed multiple themes surrounding ed-tech procurement, it lacked end-users' perspectives of ed-tech practices.

To further explore the factors impacting end-user involvement and knowledge of procurement practices, in chapter two, a needs assessment was conducted to examine the practices and involvement of end-users within three phases of procurement: product discovery, conducting needs assessments, and evaluating products. The needs assessment was conducted within a medium-sized school district of 35 schools and 19,000 students in North Carolina. Findings indicated that end-users perceive their involvement in overall procurement to be minimal. When asked about their experiences with all levels of procurement both at the school and district levels, teachers indicated they are rarely included in the process, but experience slightly more involvement at the school level.

Although end-users indicate student needs as driving factors of purchasing, they do not conduct formal needs assessments. Specifically, end-users indicated that they occasionally use student data to inform product selection, but rarely use a formal needs assessment to guide product purchases. Further, they also play a minimal role in selecting and vetting ed-tech products at the school and district-level. Once products have been selected, end-users are rarely involved in an evaluative process at the school or district-levels to examine the effectiveness of

the product.

Educators indicated that they are rarely involved in the process of identifying/discovering new products. When they do discover new ed-tech products, they utilize multiple sources to identify new tools**.** Despite many avenues for evaluating product effectiveness, end-users indicate that the most valued input on product effectiveness is the experience and opinion of peers. With an understanding of both administrator and educator perspectives on procurement practices, a review of literature to identify possible interventions to address this Problem of Practice (POP) was conducted.

Developing an Intervention on the Problem of Practice

In conjunction with the literature review of underlying factors of the POP, the needs assessment data was used to design an intervention that would increase end-users' involvement and knowledge of proper procurement practices. A second literature review spanning multiple disciplines and fields was conducted to discover best practices in proper procurement. Guiding the creation of the intervention, a theoretical framework, innovation diffusion theory, was utilized.

Innovation diffusion theory. Innovation diffusion theory was used as a theoretical approach to examine to proper procurement practices within the ed-tech market and to provide strategies for increasing the involvement of end-users in procurement practices. Specifically, Rogers' (2003) innovation diffusion theory provides a framework to design effective procurement strategies to better align ed-tech purchases with school and student needs. Employing innovation diffusion theory as a theoretical model for understanding ed-tech procurement practices also uncovered new ways to increase end-user involvement in the process. Further, including end-users in procurement processes may be key to ensuring products are used effectively and successfully (Morrison et al., 2014; Morrison et al., 2015). Using Rogers (2003)

innovation diffusion theory as a framework to identify proper procurement stages, a literature review into successful procurement strategies in various sectors/markets outside of education was conducted.

Intervention: end-user guide and professional development sessions. Because of the complexity and multi-phase nature of the factors associated with the POP, a comprehensive intervention was required. Several interventions could support individual factors of the POP, however, the overall issues of procurement would remain. For example, an innovation incubator could assist end-users in discovering new ed-tech products but fail to address issues surrounding needs assessment and product evaluation. Further, creating a template for schools to conduct needs assessment does not address issues end-users experience with discovery and product evaluation. Therefore, the intervention included a comprehensive end-user guide for procurement and corresponding professional development sessions. This provided detailed explanations and examples of each stage of procurement as identified by Morrison et al. (2014) (needs assessment, discovery, and evaluation). The intervention also relied on Rogers' (2003) innovation diffusion theory as a theoretical framework to guide the creation of the end-user guide to proper procurement.

The three-chapter end-user guide included best practices for procurement in conducting needs assessments (Morrison et al., 2011), discovering new products (Rogers, 2003; Bailey et al., 2015), evaluating the effectiveness of products (Morrison et al., 2014; Rogers, 2003), as well as strategies to increase end-user involvement (Sugar et al., 2004). The end-user guide to procurement was delivered to all educators in digital format via iBooks. To provide further support for end-users' knowledge and comprehension of proper procurement, professional development sessions were conducted. This second component of the intervention was designed to support best-practices and resources highlighted within the end-user guide while providing

hands-on experiences with each stage of procurement. The three, one-hour professional development sessions were conducted face-to-face over the course of three weeks (one session on each phase of procurement) to increase understanding of best-practices in each phase of procurement.

Evaluation Design

The purpose of this study was to examine the effectiveness of the end-user guide and corresponding professional development to proper procurement. The study examined several aspects of the intervention's ability to increase end-user participation as well as increasing end-user knowledge of conducting needs assessments for new ed-tech products. The expected outcomes of the intervention were to increase end-users' involvement, knowledge, and ability to engage in proper ed-tech procurement practices. The following research questions examined how the guide impacts end-users' likelihood of involvement and knowledge of proper procurement strategies.

RQ1: To what extent did end-users participate and engage in the intervention?

RQ2: What impact did the end-user guide to proper procurement have on the involvement of end-users in procurement practices?

RQ3: How, if at all, did participants' knowledge and attitude towards procurement strategies changed after exposure to the guide to proper procurement and corresponding professional development?

RQ4: What were end-users' perceptions of the guide and professional development?

A mixed methods approach was utilized to examine the effectiveness of the intervention, address the research questions, and evaluate the logic model. The research sample for the intervention included 11 teachers and three principals. Three schools (one elementary, one middle, and one high school) were selected at random from the district's 35 schools for

participation. Quantitative data from pretest and posttest questionnaires included data on attitude/perception and knowledge of best-practices. Additionally, qualitative data from open-ended survey items and interviews examined end-users' perceptions and engagement levels. Together, quantitative and qualitative data were utilized to provide a rich picture of participants' experiences and to gain a clear perspective of the value of the intervention.

Research Findings

The evaluation study was designed to measure several elements of the intervention including (a) fidelity of implementation, (b) end-users' perceptions of the intervention, (c) changes in end-users' involvement, and (d) changes in end-users' knowledge of procurement practices. First, in order to understand the impact of the intervention, fidelity indicators were examined through a process evaluation. The intervention was found to be implemented with fidelity with no participant attrition and all participants attending each of the professional development sessions.

Second, understanding participant's perceptions of the intervention components was key to evaluating the impact of the intervention. The evaluation revealed high participant engagement and satisfaction with the intervention. More specifically, participants suggested that their engagement was attributed to the interactive, step-by-step nature of the end-user guide and professional development sessions. Additionally, the study revealed a positive shift in participants' perceptions of ed-tech procurement.

Third, another component of the evaluation study was to measure changes in participants' likelihood of future involvement in procurement practices. The study revealed that prior to the intervention, end-users lacked involvement with procurement practices and, specifically, conducting needs assessments. Following the intervention, participants indicated a strong

likelihood of requesting involvement with procurement practices and an increased likelihood of using needs assessments to procure ed-tech products.

Fourth, the evaluation study was designed to examine changes in end-users' knowledge of proper procurement. The pretest-posttest knowledge assessment revealed statistically significant increases in end-user knowledge of procurement practices after exposure to the intervention components. Here, the intervention was successful in increasing participants' knowledge of procurement practices. End-users indicated, though, that they were more likely to use this basic knowledge in conjunction with referring back to the end-users guide in future procurement practices. In this way, the guide was seen as a framework for conducting needs assessment and step-by-step reference for completing subsequent phases of procurement.

Finally, the study sought to examine changes in end-users' attitudes and perceptions of procurement practices. Following the intervention, the attitude and perceptions questionnaire revealed statistically significant improvements in end-users' attitudes toward product discovery as well as overall procurement practices. However, the intervention did not produce statistically significant increases in end-users' attitudes toward product evaluation and needs assessments.

Overall, the results of the study supported the use of the intervention to address the lack of involvement and knowledge of ed-tech procurement practices amongst end-users. As schools and districts continue to examine ed-tech products to meet instructional needs, the intervention could provide practitioners with valuable knowledge and experiences surrounding conducting needs assessments and aligning subsequent ed-tech purchases. Additional research should include a larger sample, diverse participant population, and schools with varying levels of ed-tech integration. This intervention is a promising avenue to explore strategies for increasing knowledge and involvement of end-users in ed-tech procurement practices.

Chapter 1

Classrooms around the world are evolving as technology influences the way students learn and educators teach. As technology usage has increased outside the classroom, educational technology (ed-tech) companies have capitalized on technology's ability to personalize learning experiences for students (Hodas, 2016; Lee, 2008). These personalized learning experiences result in content that is layered with support mechanisms that account for differences in student learners. Digital technologies also allow for flexible and adaptive delivery of content so that learners are accommodated at their individualized level. The capabilities of technology to reach all learners has caused schools across the nation to acquire digital resources at accelerated rates (FutureSource Consulting, 2014).

Globally, the ed-tech movement is a $13 billion-dollar per year industry, with venture companies and startup accelerator programs spreading across the country (FutureSource Consulting, 2014). However, because of the rapidly expanding field of ed-tech, little is known about the effectiveness of most individual applications and programs (Honig & Coburn, 2008). Many ed-tech companies find it difficult to provide the empirical data and evidence needed to convince school district leaders of their product's educational merit (Morrison et al., 2015). Educators are therefore left to integrate ed-tech tools with little input on their design, selection, and evaluation (Maas & Lake, 2015). Furthermore, end-users (e.g., principals, teachers, and students) of such technology products are often absent in many phases of the procurement process (Ainsworth, 2006; Jayroe & Brenner, 2002; Morrison et al., 2014; Morrison et al., 2015). Teacher involvement in procurement has important implications in efficacy and usage of digital resources.

Statement of the Problem of Practice

Ed-tech products bring promising hope of instructional transformation to classrooms as they can support the personalized learning needs of students (Hodas, 2016). However, despite their promise, ed-tech products often go underutilized in classrooms and often do not meet students' needs (Dynarski et al., 2007; Herold, 2016). This problem is particularly relevant within my professional context.

I am currently the Chief Strategy Officer (CSO) for the Rowan-Salisbury School District. Formally, in my previous role, I oversaw the district's 20,000 device 1:1 computer program, which provides all students with an Apple device for school and at home use. Further, as CSO, I work with the technology and curriculum departments to formulate the district's procurement strategy. In this role, it is clear that ed-tech procurement presents challenges to the K-12 public sector. These challenges range from constant sales pitches via email and phone calls from ed-tech vendors to a lack of systematic processes to handle individual teachers purchasing products.

Purpose of the Study

Proper ed-tech procurement has been defined by five distinct phases: (a) allotment of funding, (b) needs assessments to identify learning needs, (c) discovery of new products (d) evaluation of new product merit and effectiveness, and (e) selection of products for purchase (Morrison et al., 2014). The purpose of this descriptive research is to discover what disconnects exist between end-users and procurement practices that ultimately lead to products that do not meet student needs. Within the context of this study, end-users' experiences in ed-tech procurement practices will be explored through their experiences in three of the five phases of proper procurement outlined by Morrison et al. (2015) including needs assessments, discovery of new products, and product evaluation. Although all five of Morrison et al.'s (2015) phases are

essential to proper procurement, these three phases were selected for their direct connection to end-user involvement in procurement.

Applied Dissertation Format

The following sections in the present chapter explore the factors established in the literature review that contribute to the Problem of Practice (POP). Then, chapter two examines these factors within the researcher's applied context, Rowan-Salisbury Schools. Through a needs assessment, the POP is explored within the professional context. Chapter three then examines research literature to identify best-practices in providing an intervention to the POP. In chapter four, a research study is conducted to assess the success of the proposed intervention. Finally, in chapter five the findings of the study are presented, as well as, a discussion of the results and conclusions.

Theoretical Framework

To fully explore the factors that have caused the current experiences of end-users in ed-tech procurement, organizational change theory and innovation diffusion theory are introduced as theoretical frameworks. These theories provide relevant background and conceptual frameworks to explain challenges within procurement in educational settings.

Organizational change theory. Change within educational entities is often met with hesitation and resistance. This aversion to change is likely caused by educators perceiving changes to policy or new reforms as disrupting their stable school environment (Koksal, 2013). Koksal (2013) suggests that for educators to integrate ed-tech tools within their classrooms they must learn new tools and fundamentally change how they instruct students. However, outside of the educational sector, in fields such as aviation and medicine, the adoption of technology is not viewed as a threat but as a required tool to perform proficiently and effectively (Ertmer & Ottenbreit-Leftwich, 2010). However, using technology as required tool to increase proficiency

and effectiveness is rarely applied to K-12 instruction (Ertmer & Ottenbreit-Leftwich, 2010). Ponticell (2003) and Byers and Frey (2012) find that, in general, education entities are hesitant to adopt new curriculum or instructional innovations and especially technology innovations. Further, Surry and Farquhar (1997) suggest that teachers are intrinsically resistant to change, which may be an underlying cause of the lack of diffusion of educational technologies in classrooms. Fabry and Higgs (1997) suggest that resistance to change has been systemic in education for hundreds of years and change often represents threats to the status quo.

This resistance to change is also applicable to the ed-tech sector as the ed-tech market has experienced substantial change over the past two decades (Bushweller, 2017; Jayroe & Brenner, 2002; Kinshuk et al., 2013; Lakhana, 2014; Morrison et al., 2015). Although the ed-tech market has expanded quickly (Kinshuk et al., 2013) the procurement practices associated with purchasing ed-tech products in schools have not followed market trends (Jayroe & Brenner, 2002; Morrison et al., 2015). For example, slow, time consuming requests for proposals (RFPs) and historic contract structures still remain. The resistance to changing traditional procurement practices may be explained by organizational change theory, which examines humans' perceptions and abilities to manage change (Gupta, 2010). Within this theory, change is an inevitable law of nature that occurs in aspects of personal and professional environments. Organizational change theory provides a theoretical framework to understand why change within procurement practices in educational entities is difficult to achieve.

To better understand change theory and its impact on ed-tech procurement practices, Burke (2002) explains three levels of change: first-order, second-order, and third-order change. First-order change is the process of change that focuses on an intervention of the subsystem of an organization and is easily revertible. For example, often districts initiate technology initiatives but fail to require its usage. In this way, change is initiated. However, if the technology is taken

away, teachers will revert to their previous ways of teaching. Second-order change targets subsystems beyond that of first-order and are successful only if first-order change occurs. In the example, districts require the use of technology as part of the technology initiative and then amend spending budgets to no longer fund previous ways of teaching including excessive paper and classroom materials. Third-order change impacts larger organizational processes and is impacted by many additional factors. Following the example, third-order change fundamentally changes the organization. Here, policies, funding, hiring and all associated practices are aligned with the technology initiative, and it would be virtually impossible to revert to practices without technology. The orders of change provide a framework for how procurement practices must be addressed. Surface level (first-order) changes are not likely to provide substantial change within an organization, thus indicating that changes to procurement practices must be systemic (third order). Much like any new initiative or change to existing polices, changes to procurement practices will be met with resistance as it will be considered a change from the status quo. Change theory must be considered to guide effective, evolving procurement practices.

Innovation diffusion theory. Change theory provides a framework for understanding how educators will respond to changes in new procurement practices. However, a framework for understanding how end-users experience the selection of new products is required to fully explore the POP. Innovation diffusion theory provides a theoretical perspective for understanding how end-users adopt new innovations. An innovation can be defined as a new concept, idea, or product (Rogers, 2003) and ed-tech products are often seen as innovations (Week, 2014). The process an innovation undergoes as it is communicated to members through a social system over time is explained by innovation diffusion theory (Rogers, 2003). This theory suggests that individuals move through five stages when considering adopting new innovations including (a) knowledge, (b) persuasion, (c) decision (d) implementation, and (e) confirmation.

Rogers' (2003) model may have implications within instructional technology in several areas including rationale for adoption (Surry & Farquhar, 1997).

Utilizing diffusion theory as a theoretical model for understanding ed-tech procurement practices may uncover new ways to increase end-user involvement in the process. Further, including end-users in procurement processes may be key to ensuring products are used effectively and successfully (Morrison et al., 2014; Morrison et al., 2015). Through examining both diffusion and change theory, procurement can be understood through innovative practices as well as how changes in institutional practices will be perceived by educators.

Factors Impacting the Problem of Practice - Synthesis of Research Literature

There is a dearth of empirical, peer-reviewed research on educational procurement and, specifically, ed-tech procurement practices. Because the ed-tech market has only recently experienced massive expansion, few research studies have examined the procurement process. Therefore, to examine multiple aspects of procurement, various disciplines such as economics, communication, business procurement practices, and sociology can be used to provide a robust overview of the literature.

This synthesis of research literature will examine five factors influencing end-users' experience with ed-tech procurement: (a) historical and antiquated procurement practices, (b) lack of needs assessments for new products, (c) barriers to discovery of new ed-tech products, (d) little emphasis placed on product evaluation, and (e) lack of end-user involvement in needs assessment and product evaluation. In the following sections, these factors will be explored to explain why ed-tech products fail to meet student and teacher needs.

Factor one: historical and antiquated procurement practices. Throughout modern American history, education has been in a constant flux of reform as educators and other stakeholders have sought to invent new ways to instruct students (Murphy & Shiffman, 2002).

The idea of educational reform can be traced back centuries as individuals have attempted to improve children through education (Tyack & Cuban, 1995) and not unlike other aspects of education, procurement practices are in much need of reform (Jayroe & Brenner, 2002). To shed light on the lack of procurement reform in educational settings, the historical perspective of ed-tech's procurement evolution will be examined in greater detail.

Outdated practices. The current and historical models of procurement do not parallel today's industry or school needs for digital resource acquisition (Hommen & Rolfstam, 2009, Maas & Lake, 2015). Specifically, despite market growth and expansion in the ed-tech field, procurement practices appear to mirror the antiquated and slower processes of textbook adoption (Bailey et al., 2015; Morrison et al., 2014). Comparing the work of Jayroe and Brenner (2002), which examined the Reading Excellence Act (1998), and Morrison et al. (2015), which studied ed-tech procurement practices in school districts, provides specific insight into the lack of change in ed-tech procurement practices. Despite the articles' difference in age, procurement has changed very little over the past decade, while the market surrounding such procurement has substantially expanded and modernized through technological advances. Although the purposes and methodologies between the studies are dissimilar, both identify similar findings and make similar conclusions: a lack of end-user involvement and historical models for acquiring non-digital resources are employed with new digital-age resources.

Beyond these studies, Maas and Lake (2015) described the outdated systems of educational procurement, which are overly complex, result in extended product contracts, and deter smaller ed-tech startup companies from working in school districts. With rapidly advancing technologies emerging daily, procurement practices must be modernized to meet the speed of market developments. These issues with procurement processes are not unique to education; the need for modernization of procurement across industries is well documented

(Ainsworth, 2006; Grudinschi et al., 2014; Lawther, 2003; Leviäkangas, Hautala, Britschgi & Öörni, 2013).

Slow procurement timeframes. Outdated and antiquated procurement practices utilized within the modern day ed-tech market have resulted in slow procurement timeframes that make procurement of innovative and emerging technologies difficult. Unlike textbook adoption methods that take years to develop, ed-tech products emerge in the market at much faster rates (Kinshuk et al., 2013). To ensure that schools are able to quickly procure these products, quicker procurement practices are needed. The added layers of outdated textbook adoption methods mean the rapid adoption of new ed-tech products lags behind new market trends and products. However, it is clear that the procurement of ed-tech products is more complicated than that of textbook procurement and the lack of modernization procurement practices results in products' delayed entry into schools (Digital Promise, 2014; Morrison et al., 2015).

Bailey et al. (2015) describes the process of ed-tech procurement to be a "time consuming, resource-intensive, expensive, risky and just plain painful" process for both educational and private sector entities (p.13). The researchers found that lengthy procurement processes can take over a year to complete. This time constraint is a challenge for smaller companies and school districts. One factor that results in slower procurement timeframes is the use of large Request for Proposals (RFP) that require considerable time and effort to construct. Morrison et al. (2015) found that both districts and vendors experience increased workloads in creating RFPs, while vendors acknowledged the additional effort required to respond to RFPs.

Overall, ed-tech procurement practices are antiquated and built for older, textbook adoption processes. School district leaders and state policy makers have put forth little effort to update old systems to match ed-tech market trends that require new procurement approaches.

Factor two: lack of needs assessments for new products. Rogers (2003) suggests a set of prior conditions (norms of the social system, previous practice, felt needs/problems) to be examined by end-users before undertaking an innovation-decision process. These prior conditions may relate to the process of conducting a needs assessment. The needs assessment process involves gathering data and evidence to prove the need or gap in students' instructional knowledge (Fabry & Higgs, 1997) and may take a variety of forms such as felt, normative, or expressed needs as conveyed through discussions with end-users and administrators (Morrison, Ross, Kalman, & Kemp, 2011). This type of evidence-based decision making can focus administrator discussion and decisions around student performance (Honig & Coburn, 2008), which would then ensure that the acquired intervention aligns with instructional needs. Conducting a formal needs assessment for new ed-tech products involves a systematic process of examining the learning needs of students and rarely are formal, robust needs assessments conducted before discovering and selecting new products (Morrison et al., 2015).

Technology planning is the process by which administrators examine end-users' needs and systemically develop plans for technology acquisition and implementation. However, end-users' needs typically are not addressed within technology planning practices. For example, Gülbahar (2007) employed a mixed-method, descriptive approach to examine a district's 516 educators, administrators, and students' opinions on how technology planning is implemented in K-12 settings. The study found that educational institutions fail to effectively incorporate technology within curricula and technology planning. This finding is likely due the lack of needs assessments conducted before product procurement.

When needs assessments are not conducted, acquired products often do not meet the needs of end-users. Sridharan, Deng, and Kinshuk (2014) used a cross-sectional research design of interviews and questionnaires to examine the differences between e-learners and e-learner

providers' perceptions and preferences of e-learning products. Further the study examined the importance of ensuring that products match the needs of students. The authors suggested that the needs and demands of learners must be adequately met but that educational entities may not know or utilize practices to comprehend the needs of learners. Evaluating the needs of end-users is often likened to supply-and-demand models (Irvine, Code, & Richards, 2013). In this theory of needs assessment as a supply-and-demand model, end-users provide demands for educational products and schools must supply such tools (Irvine et al., 2013; Sridharan et al., 2014).

The importance of effective needs assessment and planning to ensure that educational goals are met is underscored by Gülbahar (2007). Collaboration should exist between all end-users (students, teachers, and administrators) as technology is planned for and selected. Proper curricular alignment with technology planning must "expose instructional objectives that address technology competencies expected from students; designate technology needs for each separate field of study; and revise course content, programs and plans according to prior decisions" (Gülbahar, 2007, p. 954).

Factor three: barriers to discovery of new ed-tech products. Rogers (2003) suggests that the first step of the innovation-decision process is for end-users to gain knowledge surrounding an innovation's presence and undertake a process to understand its functions. As it relates to ed-tech procurement, this first step may coincide with Morrison et al.'s (2015) third step in ed-tech procurement, product discovery. The ed-tech market is saturated with multiple companies vying for similar market niches. This market saturation makes the discovery of new ed-tech products difficult as teachers have no one place to discover new tools (Morrison et al., 2015).

Administrator difficulties in product discovery. Research has documented the difficulty administrators face in identifying new ed-tech products. For example, Jayroe and Brenner

(2002) found that administrators lack the proper time needed to discover products and administrators' knowledge of existing products greatly impacts procurement decisions. Findings indicated that administrators are likely to purchase a product if there is high exposure to a product directly before a purchasing cycle. Even when additional products are available for review, administrators often chose products to which they were most recently exposed. Morrison et al. (2014) also found that superintendents have difficulty sorting through the vast ed-tech market to identify new products. Both studies suggest the discovery phases of procurement significantly challenges administrators. This problem is highlighted by Jayroe and Brenner's (2002) interviews with district and school staff who admit to conducting little internal research on new products, and is further affirmed Morrison et al.'s (2015) finding that discovery, according to superintendents, is the most difficult phase of procurement (Morrison et al., 2015).

Lack of communication and partnerships with vendors. The formation of partnerships and subsequent interactions between buyer (educational entities) and supplier (ed-tech vendors) are essential in the discovery of new ed-tech products (Smith & Humberstone, 2015). These partnerships must include collaboration, goal setting, and trust to ensure procurement is successful (Grudinschi et al., 2014). Additionally, partnerships that withstand business challenges must include well-outlined procurement processes and vendor/client interactions to be successful (Ainsworth, 2006). Partnerships and interactions between vendors and clients are an essential factor of product discovery as they provide the foundation for additional phases of successful procurement.

Kalou and Sadler-Smith (2015) provide insight into the role of communication and interactions within organizations and suggest that the communication that occurs within organizations and between vendors and clients offer substantial details into how and why relationships are formed and sustained. This study underscores the importance of partnering

between public and private sectors for increased communication to drive the discovery of new ed-tech products.

Partnerships between ed-tech companies and educational entities are also essential to product discovery. Marion et al. (2015) used a longitudinal, qualitative, multi-case ethnographic approach to examine 14 emerging ed-tech ventures. The authors found that early relationships are often evolutionary, dynamic and critical to the success of a product in the market, a finding also supported by Ainsworth (2006). When applied to issues in the discovery phase of ed-tech procurement, Marion et al. (2015) supports building strong alliances with partners for discovering new products.

Factor four: little emphasis placed on product evaluation. Following Rogers (2003) model of innovation diffusion, after finding ed-tech products through the discovery process, product evaluations enable district and school staff to examine new products for effectiveness and quality. The product evaluation process is valuable as it helps end-users acquire information regarding the product's ability to support the instructional needs and goals of students (Morrison et al., 2014).

Evidence-based decision making in procurement practices. The importance of evidence-based decision-making processes is highlighted by recent research. Honig and Coburn (2008) acknowledge that federal and state initiatives have required evidence-based decision making for educational improvements (e.g. school improvement plans, purchasing with federal funds). For example, the No Child Left Behind (NCLB) act required that schools and districts support decisions through both evidence and scientifically proven research (No Child Left Behind, 2003). The emphasis on evidence-based decision making and evaluation are also emphasized in procurement (U.S. Department of Education, 2013). Evidence-based decision making in product procurement seeks to address the effectiveness of products through rigorous

evaluation methods. In more recent national educational legislation, the Every Student Succeed Act (ESSA) (2015) also favors the use of evidence-based instructional programs. Resources such as The What Works Clearinghouse and Evidence for ESSA product reviews provide evidence-based data to educators and administrators on the effectiveness of programs using rigorous evaluation methods and data analysis.

Honig and Coburn (2008) argue that although administrators are required to use evidence-based strategies, they often struggle with implementing such practices. After examining 120 scholarly articles documenting how central office personnel make evidence-based decisions, the authors found that there are complex factors (e.g. political, normative influences, organization structure, and characteristics of the evidence) that impact the degree to which administrators use evidence to support their decisions. Dagenais, Lysenko, Abrami, Bernard, Ramde, and Janosz (2012) highlight that despite new approaches to evidence-based decision making ("knowledge mobilization, research-to-action, knowledge translation, and evidence-informed policy"), educators and administrators rarely utilize research/evidence-based practices in schools. Supporting Honig and Coburn's (2008) and Dagenais et al.'s (2012) findings on evidence usage, Morrison et al. (2015) examined administrators' perceptions of procurement practices across the United States and found that 62% of district use pilots to evaluate products and only 32% rely on rigorous evidence to support product selection. However, when interviewed, district participants suggested that pilots could be defined in multiple ways: free demo, try-outs, or field tests. Importantly, no participant indicated employing a formal pilot study including rigorous research methods to evaluate products. This finding may indicate that end-users falsely perceive that they are thoroughly evaluating ed-tech products in surface-level tryouts.

One challenge in evaluating ed-tech products is locating empirical evidence that supports an ed-tech product's merit (Herald, 2016). It is not surprising, therefore, that Morrison et al. (2014) found that less than 50% of district's use rigorous evidence to support product evaluations. Further, Honig and Coburn (2008) suggest that many districts struggle to find available, accessible, and creditable data to support their decisions. And when available, the credibility of evidence supplied is often questioned by administrators (Honig & Coburn, 2008). Specifically, evidence generated from external sources (i.e. marketing materials) is viewed as less credible due to unknown or less rigorous methodologies. End-users typically ignored external data and preferred internal data sets in decision making processes (Honig & Coburn, 2008). Additionally, Dagenais et al. (2012) found that most research-based data are rarely examined or implemented in schools likely due to administrators not fully understanding the purpose of such research in their context. Currently, very little research has examined the evaluation stage of procurement. Although Morrison et al.'s (2015) work stands as a seminal study into the procurement practices of K-12 public education sector end-users, it examined end-user involvement from the perspective of district and school administrators and lacks the end-user (e.g. teacher) perspective.

Product effectiveness data and distrust of sales people. The issue of credibility of external product effectiveness data stems from product sales pitches and distrust of sales persons. There is a stigma that sales people deceive consumers into purchasing unneeded items and make promises or exaggerations of products that do not match product outcomes (Darke & Ritchie, 2007; Jolson, 1970; Jolson, 1972; McMurray 1961). This perception typically leads to immediate distrust and suspicion of sales persons and their products (Darke & Ritchie, 2007). According to Jolson (1972), sales persons are often viewed as product presenters who seduce prospective buyers in such a way that the buyer "falls in love with it and wants to buy it" (p. 88).

More recent studies have found similar opinions of sales people. Darke and Ritchie (2007) conducted multiple experiments of individuals' perceptions of marketing, distrust and deception and found that deceptive advertising often leads to negative posturing for further advertising. Importantly, experiences with deception led to inaccurate levels of consumer judgment even when strong arguments of product effectiveness were suggested. The authors suggest that companies examine their marketing schemes to ensure they resist pressures to exaggerate product effectiveness. As companies begin to enter the ed-tech market and interact with end-users and administrators, these biases are often perpetuated by non-empirically proven product effectiveness claims (Jayroe & Brenner, 2002; Morrison et al., 2014; Morrison et al., 2015). The lack of empirically proven data provided by companies and sales persons appears to hinder the procurement process. This often leaves end-users with feelings of distrust that the data supplied on the effectiveness of a product is correct.

Factor five: end-users lack involvement in needs assessments and product evaluation. According to Roger's (2003) innovation diffusion theory, end-users of innovations must be able to understand how a new innovation satisfies a problem or need. When applied to ed-tech procurement, end-users should be able to identify their instructional needs before beginning product discovery. This intentional connection between needs assessment and ed-tech products is critical to ensuring products match students' needs. Further, after selecting several products for examination, end-user involvement in product evaluation ensures that students' needs are actually met through trials and pilots before products are purchased.

End-user involvement in needs assessments. It has been suggested that all end-users (teachers and students) and those associated with end-users (administrators, instructional support staff, parents) be a part of a comprehensive needs assessment (Fabry & Higgs, 1997). For example, when conducting a needs assessment for felt and anticipated needs for new

technologies, participants should include educators, students and parents (Morrison, et al., 2011). Given that teachers are most informed of specific student needs, their involvement in needs assessment appears to be critical for ed-tech procurement. Specifically, the process of gathering data and evidence to determine a gap in instructional knowledge enables end-users to provide input into what types of products are needed. However, research suggests that districts rarely engage in these types of assessments (Morrison et al., 2014; Morrison et al., 2015).

End-user involvement in product evaluation. End-user involvement in ed-tech product evaluation provides opportunities for teachers to interact with potential products and assess if products match student needs, further establishing buy-in for purchasing a new product. While research has documented the importance of teacher involvement in procurement practices, frequently end-users are left out of the procurement process (Jayroe & Brenner, 2002). Despite differences in methodologies, both Morrison et al. (2015) and Jayroe and Brenner (2002) found that end-users are often not included in procurement processes. Morrison et al. (2015) found that administrators perceived end-users to be involved in procurement 60% of the time. Specifically, teachers were found to be the least involved stakeholder in procurement practices.

Conclusion

This literature review identified four factors that have led to a disconnection between the procured ed-tech products and the learning needs of students which often results in underutilized ed-tech. The factors included (a) historical and antiquated procurement practices, (b) a lack of needs assessments for new products, (c) many barriers to discovery of new ed-tech products, (d) little emphasis placed on product evaluation, and (e) lack of end-user involvement in needs assessments and product evaluation. In the following chapter, factors of the POP, established through the literature review, will be examined in the researcher's professional context through a needs assessment.

Chapter 2

After reviewing the available research identifying the experiences of administrators in ed-tech procurement, there is a dearth of empirical, peer-reviewed research on educational procurement and, specifically, ed-tech procurement practices. Because the ed-tech market has only recently experienced massive expansion, few research studies have examined the procurement process. Further examining the experiences of end-users in ed-tech procurement will provide insight into this relatively new market. A robust understanding of current procurement practices will provide evidence for best-practices and consideration for future interventions.

Problem of Practice Within Professional Context

To further understand the POP within a practical context, a case study needs assessment was utilized within my school district. Examining the POP within my professional context provides evidence that supports the existence of the POP both in the literature and real-world settings. The results of the needs assessment study help to inform the intervention proposed in chapter three.

Rowan-Salisbury Schools serves 19,000 students in 35 schools, with 63% of students receiving free or reduced lunch. The school district serves a diverse population of students with approximately 39% minority students. Within Rowan-Salisbury Schools, procurement of digital resources is essential as the district provides all 19,000 students with mobile devices for learning in and out of school. Providing appropriate digital resources in a timely manner and in line with student's needs is vital to ensuring the success of the initiative. With over 1,400 educators, finding appropriate ed-tech products that fit diverse learner needs in a timely manner is challenging. Often, procurement practices neglect end-user perspectives, needs assessments are not conducted, and product evaluations are rarely completed. These practices likely result in ed-

tech products that are underutilized and therefore do not meet the needs of students and teachers. To better understand the experiences of end-users in Rowan-Salisbury Schools, the needs assessment included quantitative and qualitative methods to examine the involvement of end-users in procurement practices.

Goals and Objectives

The purpose of the needs assessment was to discover the involvement of teachers in ed-tech procurement practices in Rowan-Salisbury Schools. Further, the objectives and goals of this needs assessment were to seek to better understand the experiences of end-users within procurement practices. Specifically, the study examined the following research questions:

- RQ1 - What, if any, needs assessment activities do teachers employ to identify instructional needs of their students?
- RQ2 - What roles, if any, do teachers play in ed-tech product discovery?
- RQ3 - What processes are used by school-level staff to discover ed-tech products?
- RQ4 - What roles, if any, do teachers play in selecting and vetting ed-tech products?
- RQ5 - How do school-level staff vet and evaluate ed-tech products?
- RQ6 - What is the perspective of the superintendent on procurement practices in the district?

Methodology

In order to address the objectives and research questions of this study, a mixed-methods research design was implemented. This section describes the target population, accessible population, instrument description, and operationalization of variables.

Participants. Participants in the present study included school teachers and the superintendent from a large (19,000 students) urban public-school district in North Carolina, United States (Rowan-Salisbury Schools, 2016). Within this district, every child is given a

MacBook Air or iPad for use at school and home and all teachers have extensive access to educational technology in the form of one-to-one digital devices. The district is also a member of Digital Promise - League of Innovative Schools, a selective non-profit organization of 73 school districts across the United States. Districts are selected for their vision, advancements and leadership in technology usage in schools (League of Innovative Schools, n.d.).

Principals within the school district were solicited via email for willingness to allow their teachers to participate in the needs assessment. Three schools (one elementary, one middle, and one high school) responded to the solicitation. Teacher participants of the study were selected through a snowball sampling approach where identified principals were asked to recruit educators to participate in the study on a voluntary basis. It is estimated that 149 teachers were recruited by their respective principals and 69 teachers completed the questionnaire for a response rate of 46.3%. The participants represented various demographics including ethnicity, age, gender and experience levels. All teachers studied, read, and reviewed the informed consent research documents (see Appendix A & B). The superintendent was solicited via email and an interview time was setup.

Measures. In the following sections the definition and measurement and of each variable will be examined in further detail. A mixed methodological approach was applied, providing the researcher with the opportunity to evaluate data through both qualitative and quantitative measures (Creswell & Plano Clark, 2011). In the following sections, measures for each variable are examined, including an operational definition of variables and detailed description of the measure.

Needs assessment process. End-user involvement in the formal creation and use of needs assessments will be operationalized and defined as teachers creating and participating in a systematic process for determining and addressing student needs, or gaps between current ability

and desired ability, to aid in searches for ed-tech products. This variable will be measured by educator's perceptions of their involvement in conducting needs assessments, as well as knowledge of how to create needs assessments.

Discovery process. End-user involvement in the discovery of new products will be operationalized and defined as teachers' active participation in the process of looking for new products through the use of research journals, ed-tech journals, internet searches, peer communication and ed-tech conferences. This variable was measured through the perception of educator's involvement in discovery and specific practices undertaken by educators to discover new products.

Selection and evaluation process. End-user involvement in the selection and evaluation of new ed-tech products will be operationalized and defined through teacher involvement in selection committees, research-based purchasing decisions and evaluating products based on empirical data. This variable was measured through educators' perceptions of involvement within evaluation phases of procurement as well as practices undertaken to evaluate new ed-tech products.

Instruments. To examine the measures identified in the previous sections, three instruments were utilized. A teacher questionnaire was used to examine the perceptions and practices of educators in ed-tech procurement. A follow-up teacher interview provided supportive qualitative data to the teacher questionnaire instrument. Additionally, an interview with the superintendent was conducted to provide district-level context to ed-tech procurement in the district.

Teacher questionnaire. The teacher questionnaire contained open-ended and Likert-type (scale one to five) items (see Appendix C). The questionnaire was modified from an existing instrument by Morrison et al., (2015) that examined superintendents' involvement in ed-tech

procurement. The questionnaire was modified to fit the context of a K-12 end-user's experience with procurement as opposed to its original intent - central office administrators.

The teacher questionnaire was directed at certified teachers within three Rowan-Salisbury Schools and examines teacher involvement in ed-tech procurement (see Appendix C). The instrument is divided into seven parts and consists of 59 items. Below were the topics covered in each section as well as specific research question(s) (RQ) addressed in each section:

- Section A (Involvement in procurement practices) - RQ1, RQ3
- Section B (End-user perspective of procurement practices) - RQ1, RQ2, RQ4, RQ5
- Section C (Use of proper procurement practice) - RQ3, RQ4, RQ5
- Section D (Perceptions of stakeholder involvement at district level) - RQ1, RQ3, RQ5
- Section E (Perceptions of stakeholder involvement at school level) - RQ1, RQ5
- Section F Evaluation practices of ed-tech providers) - RQ4, RQ5
- Section G (Open-ended items) - RQ1, RQ2, RQ3, RQ4, RQ5

Teacher interviews. At the conclusion of the online questionnaire, teachers were asked if they would be willing to speak with the researcher to elaborate on their questionnaire responses. Of all questionnaire respondents, eight (11.5%) volunteered to participate in a follow-up interview and three were randomly selected to be interviewed. A semi-structured interview approach (Kvale, 1996) was utilized to discover the experiences of participants. Questions in the semi-structured interviews were adapted from Morrison et al. (2014) to fit contextually from the perspective of end-users as opposed to central office administrators (see Appendix C).

Superintendent interview. After teacher interviews were conducted, the district's superintendent was contacted to discuss the district ed-tech practices from a district-level perspective. The superintendent agreed to an interview and a semi-structured interview approach (Kvale, 1996) was utilized to discover how district personnel experienced ed-tech procurement.

Interview questions (see Appendix C) were modified from a study conducted by Morrison et al. (2014) which examined the ed-tech procurement experience of administrators.

Procedure. Questionnaires were delivered to participants within an online platform and disseminated through emails. Questionnaire links were submitted to principals who forwarded a pre-scripted message with links to the questionnaire to teachers within their schools. Interviewees were randomly selected from those participants who volunteered to participate in an additional interview. Interviews were conducted within the participant's school setting and an audio recording was used to document the interview. The superintendent's interview was conducted at the central office in the superintendent's office using an audio recording to document the interview.

Data analysis. Data from the teacher questionnaire were analyzed to yield response frequencies and descriptive statistics on Likert-type items (see Appendix C). Open-ended questionnaire items and interview data of teachers were analyzed to discover trends and themes within the data. Audio recordings from each interview were transcribed. Using an inductive, grounded theory methodology (Schutt, 2015) to code the data, I first read all transcripts to gain perspective on potential themes. An initial codebook was created and used to complete another round of coding that applied previous codes while adding, deleting, and integrating new codes.

Results

The results of the needs assessment are reported from participants' questionnaire responses and interviews. Descriptive statistics and frequencies of responses are presented in Appendix D. The following sections are broken into themes to help uncover trends within the results. Within each theme, results are presented with connections to research questions and the POP.

Theme 1: Educators discover ed-tech products through multiple sources; however,

they perceive their involvement in the discovery phase as infrequent. Teachers were asked to indicate their involvement within the discovery phase of procurement and roughly two-third (68%) responded they are rarely involved in the process of identifying new products within the discovery phase of procurement. The reader should be reminded of the Likert-type scale (one to five). Additionally, 46% of teachers who responded indicated they have no involvement at all in discovering new ed-tech products.

When asked about frequency surrounding the discovery of new products in their classrooms, the majority (78%) of teachers indicated that they sometimes/always look for new ed-tech products. Teachers indicated that input from peers and other teachers was among the most used strategy to find new products (see Figure 1). Additionally, Internet searches, communication channels, and conference attendance appear to be frequently used to find new products. Interviews with teachers also corroborate these findings. One teacher explained the discovery phases as, "I find out about new products from other teachers and then go try them to see if I like them".

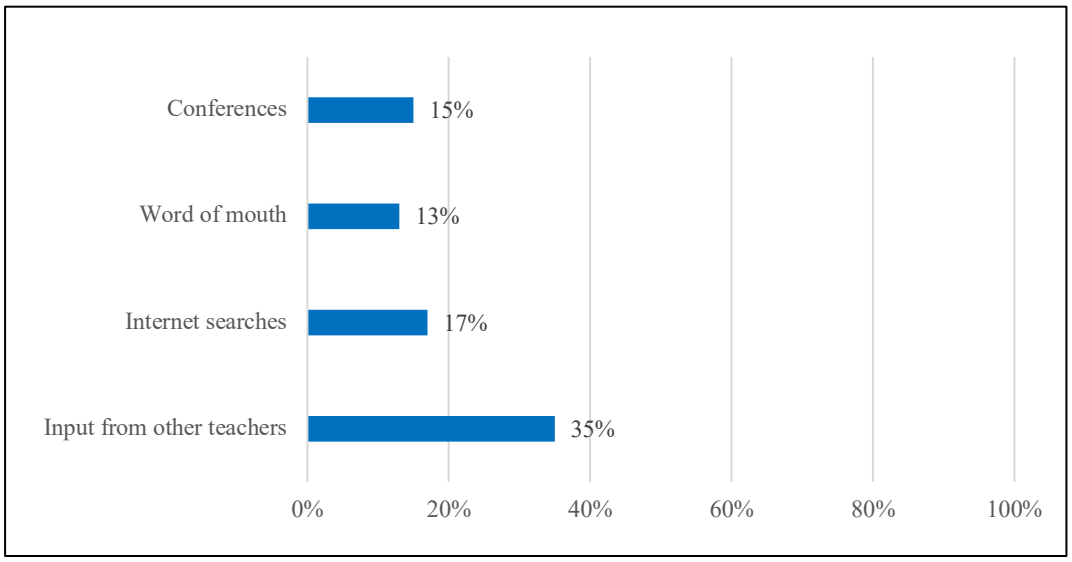

Figure 1. Percent of participants indicating how they discover new ed-tech products.

It is clear that educators are rarely involved in the discovery process of procurement process at school and district levels. However, they do use multiple means to discover new ed-

tech tools for their own classrooms. Of these discovery strategies, the suggestions of other teachers are most used.

Theme 2: Educators perceive their involvement in procurement to be minimal. The involvement of educators in procurement practices has important implications in product usage, educator buy-in, and efficacy. School-level and district-level and differences in level of involvement were apparent (see Figure 2). A majority (90%) of teachers indicated they are rarely involved in purchasing practices, while 81% are rarely involved evaluation of new products, and 78% rarely provide feedback about product purchases. A majority (83%) of teachers surveyed have never been involved with purchasing products at the district-level. Roughly two-thirds (70%) of teachers perceive themselves to be minimally involved in district-level procurement practices. A majority (85%) of teachers perceive student's as rarely involved, while 86% of teachers perceive parents to have no involvement with procurement. Within teachers' perception of district-level procurement, teachers indicated that as bureaucratic levels increase, procurement involvement increases (see Figure 2). Just over one-third of teachers (39%) believe that their opinions are valued in general procurement practices at the school-level, while only 22% of teachers their perceived opinions are valued at the district-level.

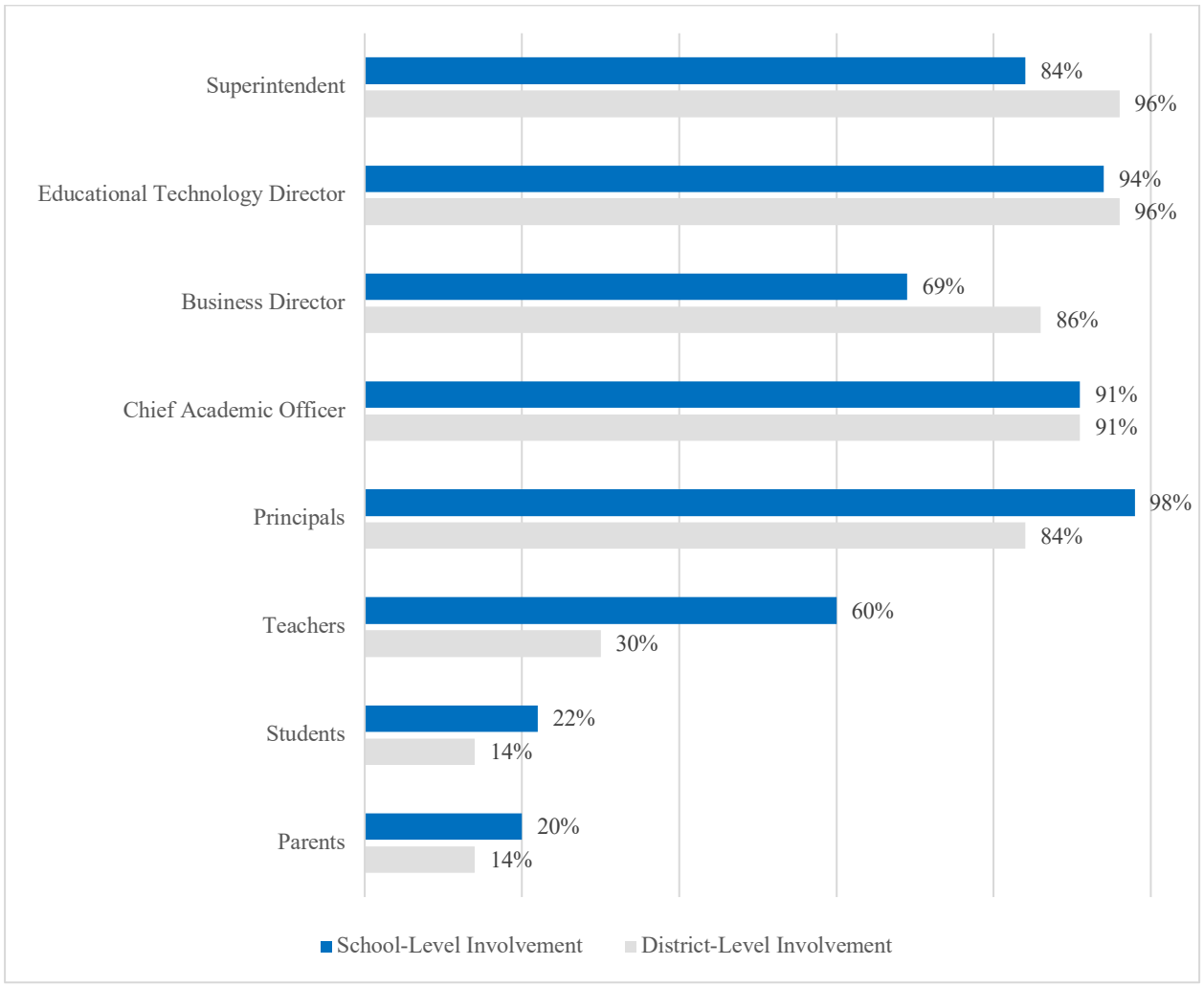

Figure 2. Teacher perceived frequency of moderate-extensive responses regarding the involvement of various stakeholders at the school and district-level.

Though a minority (30%) of teachers indicated moderate-extensive involvement in procurement at the district level, a greater proportion (60%) reported moderate-extensive involvement at the school level. Similarly, principal involvement also increased (84% district, 98% school). Perceived district-level leadership involvement in procurement at the school-level revealed increased moderate-extensive involvement (91%) of the chief academic officer and slightly less (85%) involvement of the superintendent.

This theme seeks to address overall involvement of educators in procurement practices. Therefore, it addresses several of the research questions in a broad fashion. It is clear that

teachers are not perceived as being involved in district-level procurement practices, however, school-level involvement is higher, but still low.

Theme 3: Although educators indicate the use of student needs as driving factors of purchasing, they do not conduct formal needs assessments. Within proper procurement practices, needs assessments are conducted before any discovery of new products. When asked, half (50%) of the educators indicated they rarely/sometimes examine student data to identify areas of needs for potential ed-tech purchases and a small majority (51%) rarely/sometimes conduct formal needs assessments before exploring potential matches between student needs and available ed-tech products. During interviews, teachers indicated that student needs are "driving forces" in product discovery, however, formal needs assessments are not conducted. Open-ended participant responses suggest that student's needs are identified through the use of data on student performance tasks (assessments and benchmarks), but that these needs are not formally used to inform discovery processes.

Teachers indicated that needs assessments are important to identifying student needs but they do not conduct formal needs assessment to establish learning gaps. Identifying learning gaps provides the basis for proper discovery of new ed-tech tools to meet student learning needs.

Theme 4: Educators play a minimal role in selecting and vetting ed-tech products at the school and district level. The selection and evaluation of new products is important to ensuring that educators have buy-in and experiences with new ed-tech products. Although involvement is important to procurement practices, roughly one-third (31%) of teachers indicated that they sometimes evaluate new products sometimes. A majority (60%) of teachers perceive they have not had an opportunity to serve on ed-tech evaluation committees. These types of committees play a central role in evaluating and selecting new products for implementation within schools.

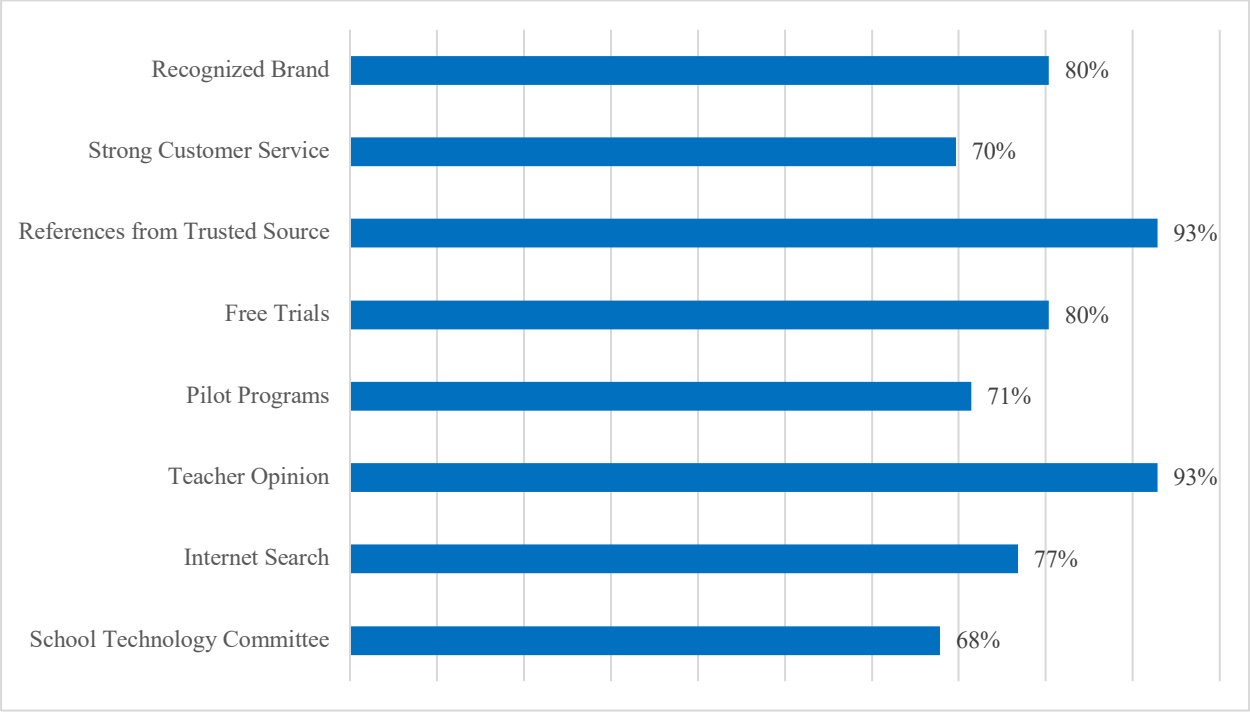

Figure 3. Frequency of moderate-extensive responses of educator reliance on various evaluation measures.

When educators were specifically asked how they evaluate products at the school and district level, few (10%) teachers indicated that they most of the time/always used pilots to identify potential ed-tech products, though a greater proportion (25%) reported using free trails. Teachers were also asked to indicate their degree of reliance on evaluation strategies (see Figure 3). Teachers rely most heavily on peer input and references from trusted sources over school technology committees, Internet searches, recognized product brands, pilot programs, and strong customer service. Though teachers indicated a strong reliance on peer input for product discovery, open-ended questionnaire items indicated the use of free trial offers and actual performance of the product within classroom settings as evaluative measures.

Educators employ a number of evaluative strategies to choose which products will be selected within their classrooms. However, there is no clear indication any particular practice is used extensively. Although some evaluation processes occur within classrooms, it appears that

very rarely are evaluation processes conducted more broadly at the school or district level for new ed-tech products. Educators have very little involvement in the evaluation and selection phase of procurement.

Theme 5: Teachers trust peers more than product effectiveness data from companies. Teacher opinion (93%) and references from trusted sources (93%) were perceived to be the most relied upon sources of product effectiveness within educator questionnaire responses. Data on a provider's program were perceived to be least reliable (55%). This finding is further corroborated through interviews with teachers. One teacher commented, "I would trust a teacher's opinion over data supplied by a company on effectiveness". Although this theme was specifically addressed through a research question, it has important implications in the evaluation phase of procurement.

Superintendent's context. To understand the district's current procurement practices from a central office administrator's perspective, the superintendent of Rowan-Salisbury Schools was interviewed.

Current procurement practices. When asked how the district conducts ed-tech procurement practices, the superintendent stated that, "major ed-tech purchases operate in a top-down manner." She explained that, "key senior leadership attend national events and conferences and are exposed to the latest in ed-tech products". Some types of technology conferences include, "International Society for Technology in Education, North Carolina's Technology in Education Conference, and California's Computer Using Educators". Dr. Moody also explained that beyond technology conferences, district personnel attend, "think-tank events like Digital Promise and DigiLearn, and private/public sector events such as Education Research & Development Institutes". The superintendent explained that, "as top-level administrators are exposed to new technologies these new products are discussed at weekly digital conversion

committee meetings". During this time, "new technologies are vetted by the digital conversion committee and a decision is made as to whether a product should be examined further". If a product is selected, "teachers are invited to both formal and informal experiences to vet the product further". Finally, the superintendent explained that by using a rubric created by the district, "teachers vet products and provide insight into the product's merit". She went on to say that, "if teachers provide positive feedback, the digital conversion committee will then begin negotiations with the company to procure the product".

Role of educators in procurement practices. When asked about the role of educators in the procurement process, the superintendent stated that, "educators are closest to students and are most knowledgeable about what tools are needed in classrooms". Specifically, teachers have, "an understanding of both the curriculum needs of their students as well as how to best engage students". When it comes to curricular alignment and product evaluation, "educators are able to determine which products most align to their curriculum" and they can, "evaluate which products most engage their students". The superintendent did suggest that gathering feedback from over 1500 teacher does create logistical challenges saying, "we value the opinions of all of our teachers, but gathering feedback from so many teachers can often be difficult". Dr. Moody went on to identify ways educators are involved in procurement including, "surveys, pilot programs, the educator's playground, and through ed-tech vendor fairs".

Areas of improvement. The superintendent was also asked to reflect on how ed-tech procurement practices might be improved or enhanced. She explained that, "there are certainly ways we can improve our practices". One of the areas for improvement is, "our needs assessment process". She stated that, "our needs assessment process is more robust at the district-level, but we do not have a formalized process across the district at the school-level". One possible solution to this area of improvement may be to, "create a needs assessment process

that is templated so that principals could conduct them in a consistent manner at their schools". Dr. Moody went on to say that, "we could then use that data to make purchasing decisions on district-wide products". Another area of improvement is the way in which companies request to work with the district and how the district, "responds to hundreds of solicitations from ed-tech companies and vets them based upon a rubric". Dr. Moody suggested that the district "develop a robust vetting process that involves teachers and administrators to decide which companies best match our needs".

Conclusion

The needs assessment examined procurement practices from the perspective of end-users and revealed several themes: (a) educators discover ed-tech products through multiple sources; however, they perceive their involvement in the discovery phase as infrequent, (b) end-users perceive their involvement in procurement to be minimal, (c) although end-users indicate student needs as driving factors of purchasing, they do not conduct formal needs assessments, (d) educators play a minimal role in selecting and vetting ed-tech products at the school and district level, and (e) teachers trust peers more than product effectiveness data from companies. The needs assessment also revealed a district-level perspective of ed-tech procurement. In this perspective, a top-down approach is utilized that brings digital technologies to classrooms. Further, teachers' input on ed-tech products is valued, however, classrooms and schools are not required to conduct needs assessments prior to purchasing products.

The results from the chapter two needs assessment provide a practical perspective of the POP and confirmation that elements of the POP exist within schools. Through the chapter one literature review and chapter two needs assessment, end-user involvement in procurement practices and conducting needs assessments were examined as a function of ensuring that new ed-tech products match student needs. However, despite the evidence for these practices in

proper procurement, there is still a lack of end-user involvement and needs assessments are rarely conducted.

Chapter 3

End-user knowledge and involvement in proper procurement practices is vital to ensuring new products address and match the learning needs of students. The literature review in chapter one and the needs assessment in chapter two revealed several challenges end-users experience when procuring new ed-tech products. The following themes emerged and will be addressed through a review of relevant intervention research literature: a lack of knowledge surrounding creating and conducting needs assessments, and a lack of end-user involvement in procurement practices.

Literature Review of Intervention Research

Given the findings from the literature review and the needs assessment, this chapter examines intervention research into proper procurement practices to provide a framework for a possible intervention to the POP. Further, procurement research from various private sectors was examined to provide evidence of innovative and effective procurement strategies that could be applied to the POP and subsequent intervention. The following research literature identifies proper and innovative procurement strategies relevant for the ed-tech sector and for development of an intervention to the POP.

Theoretical Approach

Rogers' (2003) innovation diffusion theory provides a theoretical framework to design effective procurement strategies to better align ed-tech purchases with school and student needs. In the following sections innovation diffusion theory will be defined, explained, and applied as a framework for developing an intervention to the ed-tech product procurement process.

Applying innovation diffusion theory as a theoretical model for understanding ed-tech procurement practices may uncover new ways to increase end-user involvement in procurement. Further, including end-users in procurement processes may be key to ensuring products are used

effectively and successfully (Morrison et al., 2014; Morrison et al., 2015). To address how Rogers' innovation diffusion theory correlates to ed-tech procurement, the stages of Rogers' innovation-decision process will be examined as well as the importance of end-user involvement in the diffusion of innovations.

Stages of innovation-decision process. As introduced in chapter one, innovation diffusion theory has implications in the adoption of new products. This theory suggests that individuals move through five steps when considering adopting new innovations: knowledge stage, persuasion stage, decision to adopt or reject stage, implementation stage, and confirmation stage (Rogers, 2003; see Figure 4).

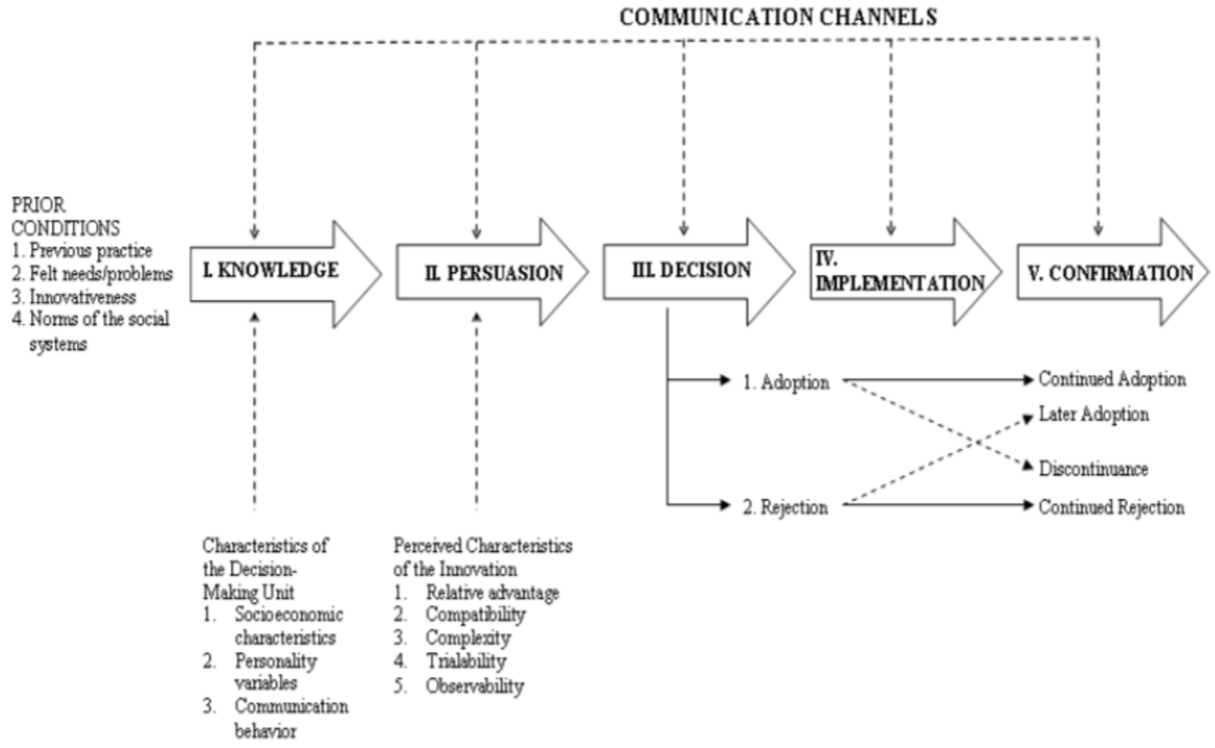

Figure 4. Five-stage process of innovation adoption (Rogers, 2003, p.170).

Prior conditions. Before engaging in the sequential stages, Rogers (2003) denotes the importance of prior conditions that end-users must consider before entering into the innovation-decision process. Prior conditions include an individual's prior practice with an innovation, any

identified needs or problems, an individual's innovativeness, and the structure of their social system. As it relates to ed-tech procurement, before end-users begin the innovation-decision process, they must first identify an instructional or student need by conducting a needs assessment. Once this prior condition is established, the end-user enters into the knowledge stage of the innovation-decision process by discovering new ed-tech products.

Knowledge. The first stage described by Rogers (2003) involves knowledge of an innovation. Within this stage, an individual gains general knowledge about the innovation and its functionality. As it relates to ed-tech procurement, end-users encounter similar experiences with new products, as they uncover elements of functionality and usability.

Persuasion. Based upon initial impressions of the innovation or product, Rogers (2003) suggests that individuals move into a persuasion stage during which the individual forms an opinion about the innovation's benefits and less desirable attributes. Ideally, this process occurs within ed-tech procurement as end-users examine new products and evaluate a product's features against data from a needs assessment.

Decision. Once an individual has examined an innovation's merit, the individual acts upon their opinion and makes a decision about accepting or rejecting the innovation's use (Rogers, 2003). Within ed-tech product procurement, this stage involves a decision-making process that may be guided by peer reviews, individual examination of the product, and existing research.

Implementation. After a decision is made to move forward with an innovation the product is put through an implementation phase. As it relates to ed-tech, during this phase, end-users implement products in various ways including pilots and free trials.

Confirmation. In the final stage, an individual evaluates the effectiveness of the innovation and decides to continue or discontinue product usage. Within ed-tech procurement,

having completed a pilot or free trial, end-users make final decisions about moving forward with the ed-tech product.

Elements of diffusion. Innovation diffusion theory is comprised of several elements that act upon the rate of adoption of an innovation: the innovation, social system, communication channels, and time (Ashley, 2009). There are numerous social factors that impact the uptake of innovations, including an individual's political beliefs, personal preference, and institutionalized understandings. Specifically, diffusion theory suggests numerous factors influence product adoption, such as previous circumstances, adopter preferences, and the views of leaders supporting the innovation (Wolfe, 1994). These elements are also essential to the procurement process end-users undertake when examining a need for new ed-tech products.

The influence of social factors can also be applied to ed-tech procurement as end-user preference, previous exposure to products, and the viewpoints of administrators and sales people play a role in the innovation-decision making processes. Ashley (2009) suggests that opinion leaders, who are early adopters of innovations, play a substantial role within social factors of innovation diffusion theory. Applied to ed-tech procurement, early adopter end-users, such as teachers, play key roles in ed-tech product implementation and purchasing. In this way, early adopters act as catalysts for innovation diffusion because they have significant knowledge and motivation for implementing new products (Reinhardt & Gurtner, 2015). If the adoption of new products is to succeed, end-users should be actively involved in ed-tech procurement practices.

Overall, when examining end-users' experiences in ed-tech procurement, innovation diffusion theory provides a framework for evaluating such processes.

Needs Assessments for Ed-tech Procurement

A contributing factor of the POP, identified through the chapter one literature review and the chapter two needs assessment, is a lack of end-user knowledge and involvement in creating

and conducting needs assessments.

Using Rogers' (2003) innovation diffusion theory and Morrison et al.'s (2011) needs assessment process as a framework, the following sections examine needs assessments and end-user involvement strategies as possible interventions to address the underlying factors of the POP. Specifically, a successful intervention to the POP would supply end-users with knowledge and experiences in conducting needs assessments while encouraging their active participation in the procurement process.

Needs assessments. Needs assessments are not only utilized within education, but used across many fields to identify performance gaps. Kaufman, Rojas, and Mayer (1993) describe needs assessments as an essential tool for any sector as it identifies a current scenario's performance and associated consequences and addresses a future scenario's anticipated results and associated consequences (see Figure 5).

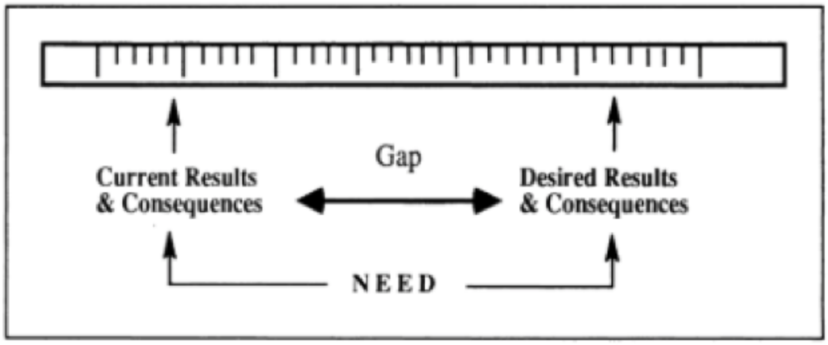

Figure 5. Needs assessments identify gaps in results (Kaufman et al., 1993, p. 4).

As it relates to education, needs assessments are often conducted to identify student learning needs to create appropriate interventions (Morrison et al., 2011). In applying Morrison et al. (2011) and Kaufman et al.'s (1993) discussion of needs assessments to ed-tech procurement, needs assessments provide a prescriptive process for evaluating the instructional needs of students by examining multiple facets of instructional gaps.

Functions of needs assessments. To properly conduct a needs assessment, it is critical to understand their scope and functionality. Morrison et al. (2011) describe four general functions of needs assessments: (a) to identify relevant needs for a specific performance task, (b) to isolate essential needs, (c) to prioritize gaps for determining an intervention, and (d) to deliver reference data to quantify the effectiveness of an intervention.

Although the four functions of needs assessments are not directly intended for ed-tech procurement, their underpinnings are applicable. In examining possible interventions to the POP, the four functions of needs assessment play a vital role in educators selecting ed-tech products through proper procurement practices. For example, when applying Morrison et al.'s (2011) needs assessments functions to ed-tech procurement, end-users should: (a) identify the additional instructional needs of students by isolating relevant gaps in achieving learning objectives, (b) identify the specific critical instructional need causing gaps in student performance, (c) identify the specific learning gap priorities that should be addressed through the intervention or ed-tech product, and (d) provide data on student achievement surrounding the learning gap that can be used to measure the effectiveness of an ed-tech product on increasing student comprehension. In this way, conducting needs assessments plays a vital role in ensuring that chosen ed-tech products are tailored to the needs of students and teachers.

One specific function of needs assessments within ed-tech procurement is to help better understand the needs of learners and subsequently allow for the selection of products that best match student needs. One way in which school districts use data to inform purchasing decisions is to assemble, examine, and distribute data surrounding particular reforms or initiatives (Slavin, Cheung, Holmes, Madden, & Chamberlain, 2011). When examining data in data-driven initiatives, Bernhardt (2003) suggests that many districts analyze four types of data: "student learning, demographics, school processes, and teacher perceptions" (p.26). An example of such

a reform or initiative within the context of ed-tech procurement could be a large-scale procurement of a new product to enhance student learning. This type of evidence-based decision making can focus administrator discussion and decisions around student performance (Honig & Coburn, 2008), which could then ensure that the acquired intervention aligns with instructional needs.

Needs assessment creation and implementation. Properly developing and conducting a needs assessment requires several steps including: "planning, collecting data, analyzing data, and preparing a final report" (Morrison et al., 2011, p. 37). The planning phase of the needs assessment process focuses on a specific target audience and strategies for collecting needs data are developed. After the needs assessment's target audience is identified, data are collected and analyzed to prioritize needs, and a final report is created (Morrison et al., 2011). As it relates to ed-tech procurement, the end-users' final report could be used to provide evidence to other educators and for advocating for specific ed-tech products to administrators.

Although peer-reviewed research literature specifically addressing the process of creating and implementing needs assessments for ed-tech procurement was not identified, the ed-tech Rapid Cycle Evaluation (ed-tech RCE) tool supplies end-users with specific guidelines for conducting needs assessments for ed-tech product procurement ("ed-tech RCE", 2017). In contrast to Morrison et al.'s (2011) needs assessment process, the ed-tech RCE tool echoes the importance of properly planning for the needs assessment by determining the goals, questions, and participants of the needs assessment. Further, the ed-tech RCE tool parallels the second phase of the Morrison et al. (2011) needs assessment process that describes a process for conducting a needs assessment including gathering/examining data and sharing findings. The ed-tech RCE tool augments the Morrison et al. (2011) needs assessment process as it includes

specific requirements for addressing learning objectives in the first phase of the needs assessment.

End-user involvement in needs assessments. Involvement in needs assessments provides end-users with opportunities to identify exact instructional needs within their classroom. A review of relevant research on end-user involvement in ed-tech needs assessments has been conducted and is presented below.

Fabry and Higgs (1997) suggest that the comprehensive needs assessment include input from all stakeholders involved in the outcome of the needs assessment (i.e. teachers, administrators, and students). Through inclusion of all stakeholders, schools are able to holistically identify their needs and compare them to current resources, identify gaps, and plan accordingly (Fabry & Higgs, 1997). Further supporting the importance of stakeholder involvement in needs assessment creation and implementation, Gülbahar (2007) examined the importance of effective needs assessment and planning to meet educational goals. Gülbahar (2007) solicited teachers', administrators', and students' opinions on how technology planning is implemented in a K-12 private school. The author found that collaboration should exist between all end-users (students, teachers, and administrators) as technology is planned for and selected to ensure products best match instructional needs.

Further, Adams-Bass, Atchison, and Moore (2015) researched the importance of end-user involvement in procurement practices by examining how to better run ed-tech pilots. The study examined questionnaire data of 1,298 students and teachers on how they experienced school technology decisions. Results indicated that more formal interactions and experiences are necessary for end-users to provide feedback through online questionnaires and other qualitative methods. These findings are echoed in a report created by Villavicencio, Schwab, and Lafayette (2016) suggesting that districts take strategic steps to ensure that end-users are involved in

multiple phases of ed-tech procurement.

Although end-user involvement is encouraged in ed-tech procurement, standard centralized ed-tech procurement practices do not always elicit end-user feedback (Digital Promise, 2014). Leviäkangas, Hautala, Britschgi, and Öörni (2013) used a qualitative analysis of Finland schools to examine novel school procurement practices and found that new, innovative procurement practices such as decentralized procurement processes, where schools had autonomy over purchasing, ensured sensitivity to educators' feedback and needs. The authors also indicated that the new model of decentralized procurement provided several perceived improvements over the traditional centralized practices, including service level improvement, higher end-user satisfaction, and unit cost reduction. These findings could provide valuable insight into specific components needed within the intervention to foster end-user involvement in ed-tech procurement practices.

Importance of conducting needs assessments. Despite the importance of conducting needs assessments for new ed-tech products, few empirical studies in the ed-tech sector articulate the process for creating and implementing needs assessments. Therefore, research literature from other sectors has been examined to articulate the proper protocols and strategies required for conducting needs assessments in educational settings. For example, a study by Sampson (2007) identified a performance gap within the Department of Defense (DoD). In this case, civilian senior leaders were tasked with reading hundreds of technical governmental documents each day and were unable to comprehend technical jargon and acronyms. The author conducted a needs analysis of both military and civilian employees tasked with reading these DoD briefs. Through the needs assessment, it was discovered that the writers of DoD briefs failed to consider their audience's needs as non-military, civilian individuals. Because the needs assessment was conducted, new protocols were created to ease the burden of reading DoD briefings.

Within manufacturing, needs assessments are also conducted to address issues of efficiency and production schedules as in the case of General Motors. Finson and Szedlak (1997) collaborated with General Motors to conduct a needs assessment on the performance issues of skilled laborers at a fabrication plant. The needs assessment identified several performance gaps including efficiency declines, frequent changes to manufacturing schedules, and delays corresponding with a lack of raw product. This study led to organizational changes in how management trains new employees on the fabrication line. In the research of Sampson (2007) and Finson and Szedlak (1997), a needs assessment was conducted to identify underlying problems within an organization.

As it relates to education, needs assessments can be utilized to identify instructional/student learning needs and provide data to identify products that answer instructional and student learning needs. Hilbert, Renkl, Schworm, Kessler, and Reiss (2007) conducted a needs assessments to identify an intervention for increasing mathematics instruction and identifying mathematics instructional tools within schools. Through examining videos of classrooms and interviews with teachers, the researchers used the needs assessment process to identify issues with instruction and subsequently improved computer-based learning techniques.

The importance of conducting needs assessments when planning for the integration of ed-tech is established in prior research. Through the process of qualitatively analyzing eight technology award-winning school districts, Levin and Schrum (2013b) identified eight indicators that positively influenced school improvement. Specifically, two indicators point to the importance of conducting needs assessments: (a) proper technology planning and (b) an emphasis on strong curriculum and instructional practices. When end-users examine new products as part of the technology planning process, needs assessments play an integral role in identifying student needs that technologies can solve. These findings are also supported by

Gadgil and Louw (2016), who conducted a case study analysis of three American public school districts to evaluate ed-tech product selection processes. The researchers concluded that when districts conduct thorough needs assessments and discover products that properly align to their curricular needs, they are more likely to produce meaningful evidence to evaluate products and subsequently procure better, new ed-tech products.

Though Levin and Schrum (2013b) conclude that technology planning/purchasing and curriculum/instructional practices should be correlated, often times needs assessments are not conducted before purchasing products (Jayroe & Brenner, 2002; Morrison et al., 2014; Morrison et al., 2015). Increasing the likelihood that products are tied to the needs of learners and educators is essential to product usage and efficacy (Digital Promise, 2014). Given that teachers are likely the most informed of specific student needs, their involvement in needs assessment appears to be critical for ed-tech procurement. Specifically, the evidence-based process of gathering data and evidence to determine gaps in instructional knowledge requires end-users to provide input in the decision-making process.

Potential Intervention to the Problem of Practice

Within the previous sections, best practices for conducting needs assessments and involving end-users in ed-tech procurement have been identified through a relevant literature review. However, no intervention or research study has examined how best practices for procurement can be translated and implemented to end-users. Because of the complexity and multi-phase nature of the factors associated with the POP, the intervention examined end-user's first step to procurement, conducting a needs assessment. The proposed intervention involved a comprehensive end-user guide for creating and conducting needs assessments for procurement of new ed-tech products. The end-user guide addressed conducting needs assessments and provided practical advice and relevant resources for application in K-12 school settings. To provide

further support for end-users' knowledge and comprehension of proper procurement, professional development sessions were conducted. This second component of the intervention supported the best-practices and resources highlighted within the end-user guide while providing hands-on experiences with conducting needs assessments. The expected outcomes were to increase end-user knowledge of proper procurement practices while increasing involvement of end-users.

Conclusion

The intervention literature review into innovative and successful procurement practices revealed several themes that provided evidence for a successful intervention. Multiple studies point to the importance of evidence-based decision-making practices, end-user involvement in procurement, and the use of needs assessments. To answer several factors of the POP, specifically the lack of end-user involvement and a lack of needs assessments, an end-user procurement guide and corresponding professional development was identified as a possible intervention.

Chapter 4

A literature review of current procurement practices in schools revealed several factors that appear to impact the way ed-tech products are procured, and lead to a misalignment between ed-tech products and student needs. A needs assessment was conducted to examine these factors within my professional setting and revealed a lack of end-user knowledge and involvement in procurement practices including needs assessment creation and implementation. Based upon the findings of the literature review and needs assessment, a second literature review was conducted using Rogers' (2003) innovation diffusion theory and Morrison et al.'s (2011) needs assessment process as a framework. The findings of the intervention literature review revealed rationale and processes for increasing end-user involvement as well as applicable frameworks for developing ed-tech needs assessments which were subsequently used to create the intervention.

The purpose of this study was to examine the effectiveness of the end-user guide and corresponding professional development. The study examined several aspects of the intervention's ability to increase end-user participation in procurement as well as increasing end-user knowledge of conducting needs assessments for new ed-tech products at the micro-level of needs assessment. The expected outcomes of the intervention were to increase end-users' involvement, knowledge, and ability to engage in proper ed-tech procurement practices.

The following research questions examined how the guide impacts end-users' likelihood of involvement and knowledge of proper procurement strategies. Research questions included:

RQ1: To what extent did end-users participate and engage in the intervention?

RQ2: What impact did the end-user guide to proper procurement have on the involvement of end-users in procurement practices?

RQ3: How, if at all, did participants' knowledge and attitude towards procurement strategies changed after exposure to the guide to proper procurement and corresponding professional development?

RQ4: What were end-users' perceptions of the guide and professional development?

Research Design

An explanatory sequential mixed methods design (Creswell & Plano Clark, 2011) was employed to provide the researcher with quantitative data that can be validated and further explored through qualitative data gathering and analysis. This approach provided the evaluator with multiple qualitative and quantitative perspectives on the intervention's outcomes (Newcomer, Hatry, & Wholey, 2010) Further, the design utilized a formative approach as described by Newcomer et al. (2010) and Rossi, Lipsey, and Freeman (2004) to address, shape, and improve the end-user guide and professional development intervention. The following sections explain the design of the process and outcome evaluations.

Process evaluation. The proposed logic model provided for several short, medium, and long-term outcomes for the intervention. However, to ensure that the outcomes of the intervention were truly attributable to the intervention components, the process of implementation must be examined. As it applies to the intervention, fidelity of implementation was defined as the degree to which the end-user guide and professional development intervention was effectively implemented. Specifically, the fidelity of implementation examined how well the intervention was correctly delivered and implemented compared to the research-based model designed and presented on the basis of a relevant literature review. However, to accomplish this, it was important that a clear description and definition of the intervention was created and tied to theoretical underpinnings (Nelson, Cordray, Hulleman, Darrow, & Sommer, 2012). By measuring fidelity of implementation, the researcher ensured that the findings of the study were

not erroneously attributed to an intervention component but attributed to improper implementation (Dusenbury, Brannigan, Falco, & Hansen, 2003).

In measuring fidelity within the study, high fidelity was constituted by 100% of participants receiving the end-user guide, and 80% or higher of all participants attending three PD sessions, and high end-user engagement with PD sessions. In relation to the intervention, high fidelity ensures the process of implementation was properly followed and that the outcomes of the study were attributable to the outputs (Dusenbury et al., 2003). Low fidelity of implementation within the study likely indicates that the implementation process was not properly conducted and that the outcomes of the study were not be attributable to the intervention (Dusenbury et al., 2003). The specific fidelity of implementation indicators will be elaborated within the measures section of this chapter.

Outcome evaluation. The intervention was examined through multiple evaluation continuums. The evaluation used a formative approach as described by Newcomer et al. (2010) and Rossi et al. (2004) to address, shape, and improve the end-user guide and professional development intervention components. To support the formative approach, a mixed methodology was used to examine the intervention process and effectiveness of the end-user guide to proper procurement. This approach provided the evaluator with multiple qualitative and quantitative perspectives on the intervention's outcomes (Newcomer et al., 2010). For example, data on the end-user guide provided quantifiable data on its effectiveness and helpfulness to end-users and provided qualitative evidence through interviews on how the intervention could be improved. Due to the nature of the POP and intervention, the evaluation was problem oriented. The problem examined, as outlined in the POP statement, addressed the experiences end-users have when procuring new ed-tech products.

Further, due to the short evaluation period, the evaluation took place in a "one-shot" manner for which the intervention was implemented and completed, and data were collected one time (Newcomer et al., 2010). This type of intervention required close collaboration between researchers and participants. Because the end-user guide was created by the researcher and required working closely with participants, the evaluation called for close interaction with stakeholders to address research questions in a participatory manner (Newcomer et al., 2010; Rossi et al., 2004). Due to the nature of the research questions, the evaluation was goal-based. The goals of the intervention were to create an end-user guide and corresponding professional development sessions that assisted educators in the various strategies associated with procuring ed-tech products.

Method

Both quantitative and qualitative data were examined in order to fully understand end-users' experiences with the end-user guide and professional development sessions. Quantitative data on end-users' knowledge and perspectives was collected through questionnaires and qualitative data from interviews with end-users provided valuable insight into their experiences with the intervention.

Participants. The end-user guide and professional development intervention was designed for school-based end-users (teachers and principals) of ed-tech products. The research sample for the intervention included both K-12 teachers (of varying age and teaching experience) and principals. Three schools (one elementary, one middle, and one high school) were selected at random from the district's 35 schools. The principal from each school also participated.

Participants were recruited from Rowan-Salisbury Schools in North Carolina. An email was sent to all 35 principals within the district with information explaining the study. Principals were asked to respond if they and their teachers were willing to participant. Of the 35 schools,

five elementary schools, three middle schools, and three high schools volunteered with an overall response rate of 31%. One school from each grade span (one elementary, middle, and high school) was selected at random through a random number generator. Principals were asked to identify three to four teachers from their school who may be interested in participating. A recruitment email from the researcher was sent to each identified teacher explaining the research study and asking for their voluntary participation. A total of 11 teachers and three principals participated in the study.

Measures. This section examines the measures used to examine the fidelity of implementation and outcomes of the research study (see Table 1). Process measures examined the fidelity of implementation of the intervention to ensure that no outside variables impacted the results of the study (Dusenbury et al., 2003). After addressing process measures, outcome measures were identified and examined.

Table 1

Research questions, measures, data sources, and timing.

Evaluation Type	Research Question	Measure/Data Source	Timing
Process Evaluation	RQ1: To what extent did end-users participate and engage in the intervention?	Professional Development Sign-in Sheet	Participants signed in at each of the three professional development sessions.
		Received iBook File - Signature Page	Participants signed to acknowledge they received the iBook file.
		Teacher and Principal Interviews	Interviews were conducted after completion of the intervention.
		Intervention End-user Perception Questionnaire	Questionnaire administered following the intervention.
Outcome Evaluation	RQ2: What impact did the end-user guide to proper procurement have on the involvement of end-users in procurement practices?	Teacher and Principal Interviews	Interviews were conducted after completion of intervention.
		Intervention End-user Perception Questionnaire	Questionnaire administered following the intervention.
Outcome Evaluation	RQ3: How, if at all, did participants' knowledge and	Comprehension Assessment	Pretest questionnaire administered prior to

	attitude towards procurement strategies changed after exposure to the guide to proper procurement and corresponding professional development?		intervention. Posttest administered following intervention.
		Attitude and Perceptions Questionnaire	Questionnaire administered before and after completion of intervention.
Outcome Evaluation	RQ4: What were end-users' perceptions of the guide and professional development?	Teacher and Principal Interviews	Interviews were conducted after completion of intervention.
		Intervention End-user Perception Questionnaire	Questionnaire administered following the intervention.

Process measures. To measure fidelity of implementation, several fidelity indicators were selected for measurement. The following indicators provide evidence that the implementation process was undertaken with fidelity and that the results of the intervention were attributable to the intervention components (see Appendix F) (Dusenbury et al., 2003).

Receiving the end-user guide. The first fidelity of implementation indicator ensured that all participants received their end-user guide to proper ed-tech procurement (see Appendix F). Data were collected at the initial professional development session as each participant received their end-user guide file. As participants received their end-user guide, they were asked to provide their signature indicating they had received the iBook file.

Attendance at professional development sessions. Attendance at professional development sessions was defined as participants attending each of the three, one-hour professional development sessions. Attendance at each of the three professional development sessions was documented via a pre-printed sign-in sheet. Participants were asked to sign in to each session before the session began. As it relates to the logic model, participant attendance at professional development sessions is an important fidelity indicator, as professional development sessions provided participants with opportunities to apply their knowledge of procurement best-practices.

Participant engagement in professional development sessions. The final fidelity indicator was participant engagement within professional development sessions. Engagement is defined as participants engaging with the various components of the professional development sessions. Engagement is an important fidelity measure as it ensures that participants were engaged with each professional development sessions' material and content. Participant engagement was measured by post-intervention interviews and the intervention end-user perception questionnaire.

Outcome measures. To address the research questions, quantitative data on participation/involvement in procurement and knowledge of best-practices was required. Additionally, qualitative data on end-users' perceptions of the intervention, perceived future involvement with procurement, and engagement were also needed to gain a clear perspective of the value of the intervention. In the following sections, measures are examined including an operational definition of variables and a detailed description of the measure.

Teacher and principal interviews. The teacher and principal interview measure was modified from an existing interview instrument by Morrison et al. (2014) that examined administrator's involvement and perceptions of ed-tech procurement. The 11 questions asked of the principal and teacher were comparable but adapted based on the participants' position. Participants were asked to explain their perceptions of the end-user guide, understanding of proper ed-tech procurement strategies, and intended involvement in procurement following the intervention. The interview instrument was selected for its comprehensive examination of procurement practices, perceptions of procurement, and established validity. The Morrison et al. (2015) study is considered a seminal work in the field of ed-tech procurement and has been widely referenced, speaking to the instrument's validity.

The teacher and principal interview measure was employed to qualitatively examine the following dependent variables (a) perceived future involvement of end-users in proper

procurement strategies, and (b) end-users' perceptions of the end-user guide to procurement. Involvement of end-users was operationally defined as end-users' participation in each step of procurement, actively advocating for inclusion in procurement practices, and level of involvement in conducting needs assessments. End-users' perceptions of the end-user guide was operationally defined as an end-user's feedback on the intervention's various components and any changes in perception and/or attitude of ed-tech procurement practices.(see Appendix G).

Attitudes and perceptions questionnaire. The attitude and perceptions questionnaire consisted of six Likert-type scale items and was delivered to end-users before and after the intervention to examine any changes in attitude or perceptions of end-users following the intervention. The questionnaire was used to quantitatively examine several dependent variables. The measure examined the following dependent variables: (a) involvement of end-users in proper procurement strategies; (b) ability of end-users to conduct needs assessments; and (c) end-users' perceptions of procurement. Involvement of end-users was operationally defined as end-users' participation in each step of procurement, actively advocating for inclusion in procurement practices, and level of involvement in conducting needs assessments. The ability of end-users to conduct needs assessments was operationally defined as an end-user's ability to articulate the process of conducting a needs assessment. Finally, end-users' perceptions of the end-user guide was operationally defined as an end-user's feedback on the intervention's various components and any changes in perception and/or attitude of ed-tech procurement practices. (see Appendix G). Sample attitude and perception items included: (a) How would you describe your attitude towards needs assessments? (b) How would you describe your attitude toward overall procurement practices?

Intervention end-user perception questionnaire. The intervention end-user perception questionnaire was delivered to end-users following the intervention to examine end-users'

perceptions of the intervention. This section of the questionnaire contained eight Likert-type scale items and two open-ended items. The questions examined end-users' experiences with the intervention and their intent to use the information within their jobs and schools. Sample questions include: (a) Having experienced the end-user guide and professional development sessions, how likely are you to request involvement in procurement practices at your school? (b) Did the end-user guide engage me? (c) Did the end-user guide and professional development change my attitude toward procurement in a positive way? This measure examines the dependent variable - end-users' perceptions of end-user guide to procurement, and is operationally defined as an end-user's feedback on the intervention's various components and any changes in perception and/or attitude of ed-tech procurement practices (see Appendix G).

Comprehension assessment. The procurement comprehension assessment was administered to participants before and after exposure to the end-user guide and corresponding professional development. The assessment contained six multiple choice items, one matching item with five components, and five open-ended items (see Appendix H). The assessment contained a total of 100 possible points. Sample items included: (a) You have been tasked with finding a new ed-tech product for your school. Please describe the process you would use to properly procure this new product. (b) Why would it be important to include educators in the procurement process?

The comprehension assessment was utilized to examine end-users' knowledge of each stage of proper procurement. This assessment related to both of the intervention's independent variables: (a) exposure to the end-user guide and (b) participation in professional development sessions. Exposure to the end-user guide has been operationally defined as end-users reading and comprehending how to properly conduct needs assessments. Participation in professional development sessions has been operationally defined as end-users attending and actively

participating in professional development sessions on how to increase involvement and knowledge in procurement practices and needs assessments. In measuring these variables, the instrument measured the knowledge gained through exposure to the end-user guide and professional development (see Appendix G).

Instrument validity. Because the previously described measures did not exist in research literature, the reliability and validity of this new measure was examined. To ensure validity of the measures, a content expert in needs assessment and ed-tech procurement was asked to examine each item for face validity concerns. Based upon the recommendation of the content expert, the measures and individual instrument items were modified, rejected, or accepted to ensure validity. To measure reliability, internal consistency was measured using Cronbach's alpha for each instrument: knowledge assessment ($\alpha = 0.87$), perceptions and attitude questionnaire ($\alpha = 0.65$), and intervention end-user perception questionnaire ($\alpha = 0.67$).

Procedures

Based on the research literature presented in chapter three, a rationale for developing an intervention supporting end-users' conducting needs assessment and increasing involvement in procurement was presented. The following sections examine the procedure used to implement the intervention including a detailed explanation of the intervention, timeline for data collection, and data analysis.

Intervention. The objective of the end-user guide to proper procurement and corresponding professional development was to provide a solution to the factors identified through the needs assessment/literature review and provide a detailed explanation and examples of conducting a needs assessment (see Appendix I) (Morrison et al., 2014).

End-user guide. The end-user guide to procurement was delivered to all teachers and principals in digital format. Research participants were asked to read and discuss findings from

the end-user guide with school-based colleagues during the corresponding professional development sessions. To view the end-user guide in its entirety, please see Appendix I and click the download link. An overview of each of the end-user guide chapters is provided in the sections below.

End-user guide chapter one. Chapter one of the end-user guide was designed to serve as an introduction to ed-tech procurement practices. This chapter is seven pages in length and provides an orientation to the content to follow. The chapter consists of a foreword from the author, description of the purpose, intended audience, and layout of the guide, description of procurement, and a section on the importance of procurement in education. A sample of chapter one can be viewed in Appendix I.

End-user guide chapter two. The second chapter of the end user guide focuses on the specific steps of ed-tech procurement. The 19-page chapter includes videos, diagrams, interactive images, external resources, self-grading quizzes, and chapter reflection questions. The topics covered in chapter two include (a) why ed-tech in schools?, (b) the challenges educators face in ed-tech purchasing, (c) the proper phases of ed-tech procurement, (d) the importance of end-user involvement in ed-tech procurement, and (e) a chapter review. A sample page from chapter two can be viewed in Appendix I.

End-user guide chapter three. The final chapter within the end-user guide focuses on conducting ed-tech needs assessments. This chapter of the end-user guide is 17 pages and includes diagrams explaining the function of needs assessment, a video on how districts use data to drive procurement, an interactive game on the types of needs, end-user resources that scaffold each step of conducting a needs assessment, and a chapter review with a self-grading quiz and reflection questions. The topics covered within chapter three include (a) defining needs assessment, (b) function of needs assessment, (c) types of needs, (d) steps to conducting needs

assessments, and (e) a chapter review. A sample page from chapter three can be viewed in Appendix I.

Professional development sessions. To provide in-depth support for end-users' knowledge and comprehension of proper procurement, professional development sessions were conducted on each stage of procurement with particular emphasis on needs assessment. Professional development sessions were delivered over three weeks in the spring of 2018 to 11 K-12 public teachers and three K-12 principals in a Rowan-Salisbury Schools in North Carolina. The sessions consisted of three, one-hour, face-to-face training sessions to increase understanding of best-practices in each phase of procurement (see Appendix J) (Bailey et al., 2015; Guskey, 2002). The expected outcomes of the intervention were to increase end-users' involvement, knowledge, and ability in proper ed-tech procurement practices. An overview of each of the three professional development sessions is provided in the sections below.

Professional development session one. The purpose of the first professional development session was to provide participants with knowledge on the proper steps to ed-tech procurement and provide specific detail on the product discovery phase of procurement. The following learning objectives were established.

1. Learners will be able identify the correct sequence of steps to proper procurement.
2. Learners will be able to describe the phases to proper procurement.
3. Learners will be able to recognize the phases to proper procurement.
4. Learners will reflect on their own or school's current procurement practices compared to best-practices and articulate strategies to go from current procurement practices to best practices.

In order to ensure participants met these learning objectives, several professional development strategies were employed. First, participants were introduced to the concept of ed-

tech procurement, which included a brief presentation on the steps of procurement as outlined in the Morrison et al. (2014) ed-tech procurement study. Through this presentation, each phase of procurement was broken down into its various components and high-level definitions were provided. Because of the sequential nature of the professional development sessions, the first sessions was meant to provide participants with a brief overview, followed by later sessions that gave more details and information about specific phases of procurement. Following the presentation, participants were asked to take part in a Jig-saw professional development activity. In this activity, each participant was asked to review an ed-tech product discovery tool (Teachers with Apps, EdSurge Product Review, Common Sense Education, and Lea(R)n) and then share via a Google Doc their findings related the product tool they examined. Participants were asked to answer the following questions: (a) provide an overview of the resource, (b) describe what you liked about the tool, (c) describe how you might use this tool in your classroom, and (d) remaining questions about the resource. After participants answered each of the questions, they used the Jig-saw strategy to take turns describing their discovery tool to one another. Finally, they were asked to reflect on their learning and provide any questions about the content. For a complete overview of this professional development session objectives and lesson plan see Appendix J.

Professional development session two. The purpose of professional development session two was to provide an introduction to the product evaluation phase of procurement and to provide strategies for increasing end-user involvement in procurement. The following learning objectives were established.

1. Learners will be able to describe the phases to proper procurement.

2. Learners will reflect on their own or school's current procurement practices compared to best-practices and articulate strategies to go from current procurement practices to best practices.
3. Learners will be able to recognize and articulate the importance of being involved in procurement practices and needs assessments.
4. Learners will be able to identify appropriate strategies to advocate and increase their involvement in procurement.

The second professional development session began with a review of previous learning using a digital program called Kahoot!, which enables participants to compete against one another on multiple-choice questions. Review questions were formulated from content in the first professional development session. Following the review session, participants were introduced to the evaluation phase of ed-tech procurement. Following a brief introduction to the phase, participants viewed a demonstration of the Ed-tech Rapid Cycle Evaluation Tool (RCE), which creates a simple, templated process for evaluating ed-tech tools. Participants were allowed time to explore the tool individually and then discuss the tool as a group. After viewing and exploring the RCE tool, they viewed a presentation on the strategies for increasing their involvement in ed-tech procurement. At the conclusion of the session, participants were asked to reflect on their experiences and discuss any questions. For a complete overview of this professional development session objectives and lesson plan see Appendix J.

Professional development session three. The third professional development session examined how to conduct and implement needs assessments for ed-tech products. The following learning objectives were identified.

1. Learners will be able to identify sources of evidence that supports the statement that "needs assessments represent the needs of their students".

2. Learners will recognize the basics of needs assessments including: what they are, how they can identify student needs, and drive purchasing decisions.
3. Learners will be able to articulate the process of conducting needs assessments and how data is utilized.

The third session began with a recap of previous learning including a whole group review of several elements within the end-user guide. Participants then viewed a presentation on needs assessments which included a definition of needs assessments, how they are used outside of education, descriptions of the various types of needs, and the needs assessment phases. Each of the needs assessment phases were elaborated on in greater detail, while referencing the end-user guide chapter on needs assessment. Following the presentation, participants were presented with a needs assessment worksheet. The needs assessment worksheet was designed to complement the end-user guide in walking end-users through each step of conducting a needs assessment. A copy of the needs assessment worksheet can be viewed in Appendix J. Participants were then asked to move through the steps of the worksheet while mimicking the needs assessment process. At the conclusion of the needs assessment worksheet activity, participants were asked to reflect on the past professional development sessions and provide final questions on ed-tech procurement. For a complete overview of this professional development session objectives and lesson plan see Appendix J.

Data Collection. This section provides an overview of the timing of each element of the intervention as well as data collection methods. Prior to the start of the intervention, the pre-test comprehension assessment and attitude/perceptions questionnaire were emailed to participants via a link and completed through an online platform. Once participants completed the comprehension assessment and questionnaire, they received the end-user guide in digital format. Over the course of three weeks, three professional development sessions were conducted. The

questionnaire administered at the conclusion of the intervention contained the same items as the pre-test comprehension assessment and the pre-questionnaire. In addition, the questionnaire with items soliciting end-users' perceptions of the intervention was administered.

Within one week of the completion of the intervention, two researchers from Johns Hopkins Center for Research and Reform in Education contacted participants to setup interviews. Interviews were conducted using the researcher's prescribed interview questions. Outside researchers were contracted to conduct interviews to ensure that the researcher's involvement with the delivery of the intervention and position within the district did not bias participant data.

Data analysis. A variety of research methods and data analysis tools were used to measure each outcome of the intervention as part of the mixed methods research design. Depending on the nature of each measure, qualitative or quantitative methods were used to analyze outcomes.

To begin the data analysis process, all quantitative data were exported from Survey Monkey and sorted according to data source. For pretest-posttest comprehension data, each participant's responses were graded based upon a pre-generated answer sheet and were analyzed using a paired-samples *t*-test analysis to determine any statistically significant differences between pretest and posttest scores. Participant data from the pre- and post-attitude/perceptions questionnaire items were also analyzed utilizing a paired samples *t*-test analysis. Data from the intervention end-user perception items were examined for response frequency and descriptive statistics on Likert-type items.

Measures yielding qualitative data included teacher and principal interviews and open-ended questionnaire items on end-users' perceptions of the intervention. Audio recordings from each interview were transcribed and finalized transcripts were uploaded into Dedoose to be

analyzed. Using an inductive, grounded theory methodology (Schutt, 2015) to code the data, I first read all transcripts to gain perspective on potential themes. An initial codebook was created and used to complete another round of coding that applied previous codes while adding, deleting, and integrating new codes. After all transcripts were coded, themes and sub-codes were identified within the Dedoose software. This same qualitative data analysis approach was applied to open-ended questionnaire items.

Chapter 5

Within the present chapter, the results of the intervention study will be presented by research question. Following the study findings, the discussion section identifies and synthesizes relevant themes within the data while suggesting future research areas. Subsequently, the researcher's conclusions are presented and the study's limitations are shared.

Implementation Process

A mixed methodological approach provided the researcher with the opportunity to evaluate the intervention through both qualitative and quantitative measures (Creswell & Plano Clark, 2011). To provide a complete picture of the results of the intervention, data has have been presented in the results section by research questions. Process data are also presented to provide an understanding of the intervention implementation process, allowing the researcher to make specific explanations and inferences about the outcome data.

Results

The pre and post questionnaire was completed by all participants (11 teachers and 3 principals). Further, the post-intervention interviews were completed by all participants (n =14). The results of the research study are presented in the following sections according to each research question.

Fidelity of implementation. The first research question addressed fidelity of implementation, specifically the degree to which attendees participated and were engaged. Attendance logs were kept in order to document attendance at each of the three professional development sessions. All participants (n = 14) attended the sessions. Further, all participants acknowledged that they received and read the end-user guide.

I also explored the extent to which participants were engaged during the intervention. On the post-intervention questionnaire, all participants agreed that they were engaged by the end-

user guide (42.85% strongly agreed) and by the professional development sessions (85.71% strongly agreed). During interviews, participants were asked to describe their engagement level with the intervention and results corroborated questionnaire findings. Over half of the participants (n = 8) found the intervention to be engaging and as one principal stated, "It was very engaging and very insightful and useful". When asked what specific elements of the intervention were most engaging, participants referenced discussions, interactive features, and the small group setting.

Over one-third of respondents (n = 5) specifically referenced the discussions during professional development sessions. In support of this finding, one principal stated, "I am more of a people-person, so the professional development was much more meaningful to me. And just because I was able to ask questions as I needed to and he kept us very engaged". One teacher described the discussions in greater detail saying, "It became a lot more energetic, full of energy and more meaningful in the professional development [sessions] when you could go over it with someone and then talking about it."

Over half of the participants (n = 8) suggested that the interactive elements of the end-user guide and professional development sessions supported different learning preferences and provided engagement. When speaking about their engagement with the end-user guide one respondent stated, "The end-user guide, it is very engaging. It has lots of color. It has graphs, it has just lots of everything - kind of kept you interested in what was going on." Several participants also referenced the interactive elements of the professional development sessions saying, "The presenter made it kind of fun, too. It is not a topic that's very fun, but he made it kind of fun just with different little things that students would get to do, we got to do as well, some of the different games and things like that to see what we remembered. I thought it was great." Another respondent said, "The actual PD, he delivered in a great format, very involved.

It wasn't just this sit, and get, and listen. We were very involved with the PD and the learning, and engaged in actual learning. So, that, I think, was very good." One principal stated that quizzes were an engaging element of the professional development saying, "A lot of quiz-like-options throughout the PD to kind of check our understanding to make sure we were getting what he was trying to explain to us."

A small portion of participants (n = 2) appreciated the professional development's small group setting. One teacher stated, "I would say my engagement was high. It was a small group. So there wasn't any getting lost in a large crowd or being able to be distracted. It was an actual conversation around a table, which led to higher engagement, and I felt like I got a lot out of it." While another teacher said, "The professional development was very engaging. It was a small group of people. That made it a little bit easier to ask questions, to get clarifications on something that you didn't understand."

Involvement in procurement practices. The second research question examines the impact the intervention components had on the involvement of ed-tech end-users. The following sections examine participant involvement in greater detail.

Lack of involvement in procurement practices. Before participating in the intervention, questionnaire results indicated that slightly less than two-thirds (64.28%) of end-users reported they were at least occasionally asked to participate in ed-tech purchasing processes. During the interview, however, over half (n = 8) of teachers indicated that their involvement was rare. For example, one teacher said, "most teachers weren't really involved, not really involved in procurement." Several teachers suggested a rationale for their lack of involvement saying, "typically, especially as far as my school goes that is 100% out of my realm." Further, some suggested that their involvement was merely providing ideas for what was needed, as evident through one teacher's comment during the interview:

> It was more of a hunch of what we needed and we gave them ideas of some things that we could use and sometimes those things were purchased and sometimes they weren't. But aside from that, that's about all that I have ever been included in.

Other teachers suggested that their involvement with procurement was strictly through the piloting process:

> I think primarily we always know when they come back from tech conferences because as soon as they return from a tech conference the pilot gets thrown out. And a lot of times it's not what we need and we're told we're going to be piloting something.

Lack of involvement with needs assessments. When participants were asked specifically about involvement with needs assessments, a slight majority (57.14%) responded that they very rarely use needs assessments to purchase new ed-tech products ($M = 2.14$, $SD = 1.16$). This finding was supported through interviews, as a large majority of participants ($n = 11$) suggested that needs assessments were not conducted. According to one teacher, "but we do not have like a needs assessment or anything like that I'm aware of." Instead of conducting formal needs assessments, ed-tech products were often purchased based upon opinions about the product and perceived needs, as evident through one teacher's explanation of how a reading product was procured:

> The way that would work is, we need to buy a reading program. I've heard good things about this reading program. We're gonna buy this reading program and it was kind of the way it went before.

Several participants ($n = 4$) suggested that random purchases were often made that are not based on students' needs, stating that, "and so we would just find things that we liked and sometimes it would be something we needed, sometimes it wasn't". However, if any process did occur, it was likely to be a survey of teacher wants and needs ($n = 4$). As one principal stated,

"as far as the needs assessment prior to, it was really just a survey, surveying the teachers about the need, but not really focusing on actual data to back it".

Increased likelihood of involvement. After reading the end-user guide and attending the three professional development sessions, all participants indicated agreement (57.14% strongly agreed) that the intervention increased their likelihood of becoming involved in procurement practices in the future. Further, the vast majority (92.85%) indicated they were likely or extremely likely to request involvement in procurement practices. During interviews, a slight majority (n = 8) of participants suggested that their involvement would increase, with one teacher mentioning, "I think it's [the intervention] increased the likelihood and it's definitely increased my level of wanting to be involved". Several principals also noted the importance of teacher involvement, with one principal saying, "I think teachers will become an intricate piece of figuring out what we need and moving forward."

Increased likelihood of using needs assessments. With regard to needs assessments, a high majority of participants (n = 13), indicated through the questionnaire that after the intervention they were extremely likely/likely to use needs assessments to purchase a new ed-tech tool. During the interviews, they suggested specific ways in which they envision themselves using needs assessment data including: (a) using the intervention components to evaluate current products against student needs (n = 5), (b) using intervention components to review future products to ensure products match student needs in an intentional manner (n = 4), and (c) requiring evidence of student need before purchasing new products (n = 5). One principal described how her involvement might involve many of these practices saying:

> Probably the most immediate implementation of the needs assessment for us would be looking at our kindergarten to 2nd grade reading needs. We know that we have a deficit there but. . . we need to figure out exactly where it is and what kind of products would

address that specific need. So, I think, for me, here at our school, we'll probably be implementing the procurement process pretty quickly - maybe this spring before we leave to try to get some ideas in place for purchasing a kindergarten-2nd grade tool for assisting reading of some sort. We need to figure out what that need is, first.

Half of the participants (n = 7) indicated that they would use needs assessments to ensure that new ed-tech products matched student needs while over one-third of participants (n = 5) suggested that they would use needs assessments to evaluate current ed-tech products. One teacher described how she might use needs assessment in evaluating a current product saying:

> We actually have a pretty expensive program right now. I think it's for several years. We've been talking about, is this the right program now? Do we need to look for something different? I really think, through this training, we know a little more about the correct ways with our programs. I honestly believe that we will be, first of all, reassessing the program that we've already purchased and deciding, do we need to go through the needs assessment from the beginning, create a needs assessment specifically to literacy because we know that we're going to have, and figure out exactly what our needs are regarding literacy and then looking at different products, maybe piloting a couple, deciding if we want to keep the pricy one that we currently have or if we need to try something new.

Further, half of the participants (n = 7) indicated that they would use the step-by-step process outlined in the end-user guide to provide the framework for conducting their needs assessment to identify student needs. One teacher suggested that the end-user guide would help him identify student needs by acting as, "a guide for the process" because the end-user guide, "goes through every step that needs to be taken and what needs to be taken in consideration for every step before we purchase anything." A smaller percentage of participants (n = 3) indicated

that they would use the needs assessment framework worksheet to drive the needs assessment process. One principal stated:

> The presenter shared with us a tool on our last session that was a very simple process that you just kind of went through question by question to identify the needs that it just narrowed down for you what you needed to end up looking for a form of sort. So, I'm pretty sure we'll use that one immediately.

Not all participants envisioned themselves conducting formal needs assessments at the school level. A smaller number of interviewees (n = 3) indicated that their involvement would consist of using needs assessments within their classroom on a smaller scale. For example, one teacher said:

> I feel like I could maybe not have a formal needs assessment, but on my own I feel like I could come up with a good needs assessment for my children and be able to find the funds, create the needs assessment. Be able to figure out what it is that my students need and what would best benefit them as far as ed-tech type things.

Knowledge and attitudes towards procurement. The third research question explored the degree to which the intervention affected knowledge and attitudes towards procurement.

Knowledge. A paired samples t-test was conducted to evaluate changes in knowledge about procurement practices before and after the intervention. The reader should be reminded that there were a total of 100 possible points on the assessment. The results indicated that there was a significant difference in the pretest score (M = 51.07, SD = 11.58) and the posttest score (M = 77.25, SD = 8.94, $t(13) = 4.71$, p = .0004. In addition to pretest and posttest scores, questionnaire responses indicated that all participants strongly agreed that their knowledge surrounding procurement practices increased as a result of the intervention. All participants also

agreed (71.42% strongly agreed) that their knowledge of conducting needs assessments increased.

After the completion of the intervention components, over one-third of interviewees (n = 5) indicated that they were more knowledgeable of the steps of conducting a needs assessment and slightly fewer (n= 4) indicated they would rethink the way they purchase ed-tech products. One teacher's comments supported these statements as follows:

> At the beginning, I probably just would have told you we need the needs assessment list to see what we need and that procurement was getting stuff. But now I can explain it as a more in depth process of a needs assessment is to see like what do the students -- like what goals do they need to accomplish and then what tools could we find out. So it would be more in depth and procurement I could explain the fact that there should be multiple phases of the procurement and it's not just going out and buying a product.

Prior to the intervention, a majority of participants agreed (71.42% agreed, 14.28% strongly agreed) that needs assessments represent the needs of students. Following the intervention, a higher majority (92.85%) of participants agreed (71.42% strongly agreed) which reflected a statistically significant difference ($p < .001$; see Table 2). Prior to the intervention, a majority of the participants agreed (92.85% agreed, 14.28% strongly agreed) that needs assessments help ensure that ed-tech products match the needs of students. Following the intervention, however, all participants agreed (78.57% strongly agreed), which also reflected a statistically significant difference ($p < .001$).

Table 2

Results of paired samples t-tests and descriptive statistics for perceptions of needs assessments

	Intervention							
	Pre			Post				
	M	*SD*	*n*	*M*	*SD*	*n*	t	df
Needs assessments represent the needs of students.	3.85	0.66	14	4.64	0.63	14	-4.20*	13

Needs assessments can help ensure that ed-tech products match the needs of students.	4.07	0.47	14	4.78	0.42	14	-5.70*	13

* $p < .001$

Interview responses revealed that participant's descriptions of needs assessments changed over the course of the intervention with several respondents ($n = 3$) suggesting that it changed greatly. One principal offered, "it's definitely changed a ton". Almost one-third of participants ($n = 4$) stated that they had no prior knowledge of needs assessments. For example, one teacher said, "I did not know what it was. I think I'd heard the word, but I did not know exactly what the presenter was talking about when we first, when he first said the word and he was trying to get us to tell what we knew about it." A principal explained that she now has a more comprehensive view of needs assessments saying:

> The presenter introduced me to a whole new set of ways to figure out needs. He talked a lot about comparative data and self-needs and just utilizing the teachers much more in regards to figuring out what our actual needs are, not just perceived needs. So, certainly after that PD was given to us, I had a whole set of tools to be able to figure out our students' needs in a much more holistic manner than just looking at one set of data.

Attitudes. I also examined participants' attitudes toward various stages of procurement (needs assessment, product discovery, and product evaluation) and the overall procurement process, participants' perceptions prior to and following the intervention (see Table 3). Prior to the intervention, participants had predominantly favorable perceptions of needs assessments (92.85% favorable), product discovery (92.85%), and product evaluation (85.7%), with fewer (42.85%) reporting feeling favorable toward overall procurement. After the intervention, perceptions for all four of these areas increased. Paired samples *t*-tests revealed statistically significant improvements in attitudes for both product discovery and the procurement process overall, with product discovery increasing to 100% favorability and overall procurement

increasing to 92.85% favorability. Finally, all participants indicated agreement (64.28% strongly agreed) that the intervention changed their attitude toward procurement in a positive way.

Table 3

Results of t-tests and descriptive statistics for attitudes toward stages of procurement

	Intervention							
	Pre			Post				
	M	*SD*	*n*	*M*	*SD*	*n*	t	df
How would you describe your attitude towards needs assessments?	4.28	0.82	14	4.57	0.51	14	-1.47	13
How would you describe your attitude towards product discovery?	4.28	0.61	14	4.71	0.46	14	-2.48*	13
How would you describe your attitude towards product evaluation?	4.21	0.69	14	4.42	0.64	14	-1.38	13
How would you describe your attitude towards overall procurement?	3.85	0.77	14	4.35	0.63	14	-2.36*	13

* $p < .05$.

Note: ratings ranged from 1= Very Unfavorable to 5 = Very Favorable

During interviews, more than half of the respondents ($n = 8$) suggested that the process was eye-opening. For example, one teacher stated, "Really, I would say it hasn't changed, more so just because I was not familiar with it to begin with. So that I can say now that I am, I have a positive attitude about it. I'm eager to learn more". Finally, almost half of the participants ($n = 6$) indicated that they hoped the intervention would be implemented at their school or across the district. One teacher supported these findings saying:

> Honestly, I really didn't know much about it. I went from just clueless, I didn't really even know what the word meant, to really, I feel like I kind of understand the process. I'm obviously not an expert at it. But I feel like I could go through the process now. We could go through the steps and really pick a good product for our students. I feel more

comfortable with it. I feel a little bit more constant, going through the procurement process at this point.

Several participants also specifically indicated that they had a more positive view point of procurement (n = 4). One principal spoke to her change in opinion on procurement practices saying:

> I guess, all in all, it's just not such an awful process as I thought before. It's very doable and this made very easily accessible for me to be able to utilize it quickly and immediately.

Perceptions of the intervention. The fourth research question addressed end-users' perceptions of the end-user guide and professional development sessions. While all participants conveyed positive reactions to the intervention, over half of those interviewed (n = 8) explicitly indicated a positive opinion. One commented, "Overall, I think it was, the professional development was well done. The end-user guide is great". Another participant even suggested that the end-user guide and professional development be used for all decision-makers saying:

> I think anybody involved in purchasing or that wants to be involved in purchasing needs this manual because it goes through step by step, it explains every part of the process. It is very clear. The manual was very clear. I think it needs to be in the hands of anyone making decisions for procurement.

A number of participants (n = 6) indicated that the end-user guide was appealing because of its visual nature and components, while almost two-thirds of participants (n = 9) suggested that the end-user guide was user-friendly and easy to follow. As one teacher described:

> I think the end user guide is very well made... It's organized well to where you can really go through the thumbnails and see what you're looking for quickly. It's easy to use for

anybody. It's not something that you really just have to dig deep to find the information that you're looking for.

Half of the respondents (n = 7) suggested that the end-user guide would be a good resource for future procurement practices with one teachers saying, "I like that there was so much embedded in it that it's not just something that you memorize, it's something you keep going back to and its right there in one spot." One principal emphasizing its importance as a reference tool:

> I think the end-user guide will be a great resource to reference. I'm glad that I was able to keep that download; that when we finished, that was one of the perks of being able to participate with that. We got the end-user guide and it's very easy to flip through and to read and it's got quick links that can get you to places that you need to be without having to memorize that information.

A few participants (n = 2) also commented on the timing of the professional development, stating that, "it wasn't a long professional development each time we met, but we got a lot in each time and I thought the presenter did a really good job with that." However, one participant did provide feedback for improvement around the timing of professional development saying:

> The professional development was a little bit fast, but I'm sure there was a reasoning for that. We had three one-hour sessions, which I think one hour is about as much as you can really do in a day to truly absorb the information. Maybe a little bit of a longer time stamp of having the professional development each week would help just because I know it was very quick to learn all the information within a couple of weeks.

A large majority of participants (n = 11) suggested that they were very likely to use the information within their jobs. More specifically, several participants (n = 5) suggested they

would use the intervention to evaluate a current product or to purchase a new ed-tech product next school year. One principal suggested:

> You know, one of the things that was brought up during one of the PDs was software that I purchased for this year that was not done according to this guide, this plan, and that's going to be reworked for seeing if we even continue to purchase it for next year once our contract runs out. So, that's going to be a process for them [teachers] to be starting very soon.

Another teacher explained how they may use the intervention to examine future products saying, "we do have some programs coming up for renewal or to find if we need something different or new. And I can see us maybe sitting down and going through this process to decide what we need for the future."

Participant suggestions for improvement. Participants were asked to offer suggestions to improve the end-user guide and the professional development sessions. Open-ended questionnaire results revealed a large majority of participants (n = 10) were engaged with the end-user guide and that nothing more could be done to make the guide more engaging. For example, one participant stated, "I think that is was made as engaging as it could be, the links, videos, pictures of classrooms, made it interesting to look through." Only three participants made specific suggestions for increasing the engagement of the professional developments sessions with participants suggesting, "more real-life examples and situations", "more time", and "larger font to make reading the guide easier".

Open-ended questionnaire results also revealed a large majority of participants (n = 11) were engaged during the professional development sessions and that there were no areas to improve the engagement of the professional development sessions. One teacher stated, "They were perfect, short and extremely informative! They were always engaging and fun." Only two

participants made suggestions for increasing the engagement of the professional developments sessions saying “Having an outline - digitally or printed would be helpful”, and “work through each phase as if a product really were being purchased… almost like a case study of procurement”.

Participants’ perceptions of procurement in an ideal world. Interviews revealed that some participants (n = 4) envision procurement occurring through committees saying, “people at different grade levels compil[ing] programs and do[ing] the needs assessment and giv[ing] feedback with some fidelity.” Further, when asked to provide feedback on the procurement process in an ideal world, almost two-thirds of participants (n = 9) suggested that funding is essential to the procurement process and should occur after the needs assessment, with one teacher stating, “you never know when money is going to come available, so if you've done the needs assessment and you kind of already done some research about what you might need, if money comes available, you're ready.” One teacher suggested that because of timing restraints, needs assessments should be completed first saying:

> Because in education, a lot of times, it’s, okay, we have $5,000 that we need to spend by the end of the month. All of a sudden you get these budgets pop up. You need to procure something to spend them. We’ve figured out, there’s two different ways to do it. You can look at your budget and you can say, okay, this is how much money we have. We’re gonna conduct the needs assessment to see what we need, find the programs to try out. Then once we’ve collected the data, and figure out which one we want, then we spend the money. Or another really good suggestion is knowing that sometimes you have these budgets that all of a sudden pop up, then you’ve got to spend the money, go ahead and conduct the needs assessment, figure out which products you need. Then when the money pops up, you say, hey, we already know that this is what need, this is what we

want. Now all of a sudden we've got this much money to spend. Let's purchase that product. That was kind of two different ways to look at that, it made a lot of sense.

Discussion

With new ed-tech products sweeping across classrooms throughout the United States, and the new ESSA legislation requiring evidence-based strategies, ed-tech procurement strategies are ever more important. The purpose of this study was to evaluate the intervention, to understand its effectiveness in increasing participants' knowledge of needs assessments and procurement strategies, and to increase end-user involvement. In the previous section, a mixed methods approach was utilized to provide evidence addressing the various research questions. In the next section, several final components are presented including an explanation of the findings of the study with ties to research literature, limitations of the study, future research recommendations, and conclusions.

In the following sections, a summary of the study's central findings and themes will be presented. Key findings from the study include: (a) high engagement with the intervention, (b) increases in participant knowledge of procurement practices, (c) increases in the likelihood of future involvement, and (d) increases in positive perceptions of procurement and needs assessments.

High engagement with the intervention. A key intervention fidelity component was end-user engagement with the intervention. As a component of learning and comprehension, learner engagement has been shown to positively impact the learning process (Schlechty, 2011). I anticipated that high engagement with the intervention was likely to increase comprehension of the material presented in the end-user guide and professional development sessions. The results of the study show high engagement amongst all participants with both components of the intervention, with professional development sessions providing the most engagement. Through

interviews with participants, it became clear that the interactive components of both the guide and professional development sessions provide avenues to participant engagement. The visual nature of the end-user guide, its interactive widget features, videos and photos, as well as step-by-step orientation of the content increased participant engagement. Professional development sessions provided engagement through meaningful discussions, small group setting, real-life scenarios, and interactive components such as knowledge comprehension games.

Increases in the likelihood of future involvement. End-user involvement in procurement practices has shown to increase the likelihood that procured ed-tech products will match student needs (Gadgil & Louw, 2016; Levin & Schrum, 2013b). This study aimed to examine if the intervention would increase end-user's likelihood of future involvement in procurement practices. Prior to this study, participants were marginally involved in procurement practices and were very rarely involved in conducting needs assessments. Following the intervention, all participants indicated that were more likely to become involved in procurement practices in the future and an overwhelming majority indicated they would request involvement in the future.

Following the intervention, as it pertained to conducting needs assessments, almost all participants expressed that were likely to use a needs assessment to purchase their next ed-tech tool. However, when participants were asked how they might use a needs assessment in the future they differed on their intended use of needs assessments. Some participants suggested they would use them to evaluate current needs against current products, while others suggested using them to procure new products. This difference in the utilization of needs assessment is consistent with research on needs assessments implementation, which states that the formality and scale of needs assessments are greatly dependent on what an end-user hopes to learn about a given issue (Soriano, 2013).

The varying degree of needs assessment utilization may be a by-product of the quick procurement windows within which educators are forced to operate. Because public education funds often expire at the end of each fiscal year, end-users are required to rapidly spend down accounts, which may lead to procured products that do not match student needs. A review of relevant research literature resulted in no studies that examine the amount of time procurement takes in educational institutions. A better understanding of these timelines could provide insight for modifying school and state procurement policies, procedures, and processes to allow for additional time to conduct needs assessments, ensuring that purchased products have the highest possibility of matching student needs.

Increases in participant knowledge of procurement practices. Morrison et al. (2015) found that very few teachers were involved in procurement process and that districts generally did not employ best practices for procurement, including conducting thorough needs assessments and fully evaluating potential ed-tech solutions. While the authors did not directly study rationales for why best practices were not in place, potential explanations include traditional, centralized procurement policies and practices as well as end-users' lack of knowledge of various components and sequences for ed-tech procurement. The end-user guide and professional development sessions were designed to increase participant knowledge so that teachers could properly conduct needs assessments and ensure knowledge in other stages of procurement. This study revealed that end-users lacked initial knowledge of procurement strategies. Upon the completion of the intervention, findings indicated a statistically significant increase in participant knowledge regarding procurement practices. Knowledge of procurement is an important the first step to providing end-users with a set of tools to ensure that ed-tech tools properly address the needs of students (Waldron, 2018).

The intervention also sought to inform end-users of the process of conducting needs assessment in classroom and school settings for ed-tech tools. The intervention included a clear description of needs assessments, steps to conducting needs assessments, and how to apply knowledge gained from a needs assessment to procurement practices. The results of the study showed, prior to the intervention, very few participants could articulate an accurate description or application of needs assessments. However, following the intervention, participants' perceived confidence and knowledge levels increased, as well as, participants' beliefs that needs assessments represent student needs.

The usage of needs assessments as a tool for understanding student need has numerous implications for practice. Often times, end-users state that individual products within the marketplace fail to meet student needs (Herald, 2016). Using Rogers' (2003) Innovation-Development Process as a guide, end-users and companies should seek out areas for collaboration surrounding the research and development of ed-tech products. This type of collaboration provides the best opportunity for innovations to act as solutions to end-users needs/problems (Rogers, 2003). Further, the use of innovators (Rogers, 2003), those individuals who explore innovations/technologies in advance of their peers, could provide valuable insight to ed-tech companies as they research and develop new ed-tech products. Through the collaboration between innovative educators and ed-tech companies, the likelihood that products match student needs are increased dramatically.

Increases in positive perceptions of procurement and needs assessments.

Traditionally, the technology planning process of many schools has left out end-users (Gülbahar, 2007), despite the growing body of research that points to their importance in conducting needs assessments and product evaluation (Bailey et al., 2015; Fabry & Higgs, 1997; Morrison et al., 2014; Morrison et al. 2015). It appears as though knowledge and positive

perceptions of procurement are lacking among end-users. However, this could be attributed to procurement practices that largely mirror the textbook adoption procurement model, which leave end-users out of the procurement process (Bailey et al., 2015; Morrison et al., 2014). This lack of involvement could result in a lack of understanding and negative perception of ed-tech procurement practices. Therefore, the researcher theorized that if the intervention was effective in increasing awareness and knowledge, end-users' attitude toward procurement and needs assessment would become more favorable.

The results of the study show that participant attitudes improved within all measured areas of procurement (needs assessment, product discovery, product evaluation, and overall procurement), however, only increases in product discovery and overall procurement were statistically significant. As it relates to practice, understanding baseline end-user procurement perceptions data could provide valuable insight into how to best approach and involve end-users in a meaningful way in procurement practices. However, it is clear that the intervention components provide an effective framework for how to approach and engage end-users in the process. Providing end-users with positive, engaged, and meaningful procurement experiences could establish quality involvement in procurement practices, increase the likelihood of products meeting student needs and increasing product usage and efficacy (Digital Promise, 2014).

Another underlying theme of the research was participants' perception that funding is rarely available and when it does become available, there are typically tight timelines for procuring a new product. Morrison et al.'s (2015) ed-tech procurement process is initiated with funding and then moves into the needs assessment process and subsequent phases. Within Morrison et al.'s (2015) procurement phases model, the linear nature suggests that funds must be acquired before a needs assessment can be conducted. Research participants suggested that by placing funding first in the linear model, it implies that funding must first be allocated before a

needs assessment can be conducted. However, because needs assessments can take a sustainable amount of time and effort on the part of educators and principals, having a needs assessment completed would provide data to quickly purchase products within tight funding timelines. Further, conducting needs assessments prior to identifying funding may drive the procurement process, as formally unknown needs will be identified, which may spur the need for a new ed-tech product. Future research studies could examine the exact processes schools and district's follow to procure products, specifically surrounding the sequence of funding followed by needs assessments. This data could lead to additional data that suggests a revision to the Morrison et al. procurement model that places needs assessment before funding.

This research study is predicated on Rogers' (2003) diffusion of innovations theory that conceptualizes the process for which innovation are adopted within society. The Innovation-Development Process first calls for the identification of a need or problem, which transitions into research, development, and commercialization phases that ultimately results in the diffusion and adoption of the innovation. As a microcosm of society, schools and specifically school's procurement practices are also subject to the theoretical underpinnings of Rogers' (2003) theory. As it relates to conducting needs assessments for new ed-tech products, the first phase of the Innovation-Development Process, recognition of a problem or need, parallels ed-tech procurement practices. This recognition of the need or problem results in a corresponding, intentional process to develop or discover a solution to the problem. As it relates to ed-tech procurement practices, end-users use needs assessments to gather data to identify underlying student needs and then transition into the discovery phase. Through the discovery phase of ed-tech procurement, end-users examine the ed-tech market place to identify potential solutions to their student needs, with companies providing for Roger's intermediary steps (research, development, and commercialization). Further, Rogers' (2003) theory suggests that end-user

involvement in innovation diffusion is key to ensuring innovations are adopted, spread, and utilized. This underpinning is paralleled in ed-tech procurement practices. The involvement of end-users in ed-tech procurement practices ensures that ed-tech products match student needs.

In addition to ensuring products match the needs of students, the POP addressed the utilization of ed-tech products. Previous research (e.g., Jayroe & Brenner, 2002; Morrison et al., 2015) as well as the this study revealed a general lack of end-user involvement, but also emphasized its importance. Involvement of end-users may have important implications beyond ensuring procured products match student needs. End-user involvement in procurement practices could have implications on end-users' utilization of ed-tech products. For example, involvement in procurement practices could result in greater educator buy-in and investment for procured products. In this way, educators who are involved in the needs assessment, discovery, and evaluation of products are likely to have a vested interest in the products that are procured and may be more likely to utilize them in their classrooms. This notion is also supported by Rogers (2003) which examined different scenarios for which innovations are adopted and their related social systems.

Rogers (2003) suggests there are three types of decisions in which innovations are adopted: optional innovation-decisions, collective innovation-decisions, and authority innovation-decisions. Of these three, authoritative innovation-decisions are those made by a few powerful individuals within an organization with little to no input or influence from end-users. This type of innovation-decision results in the fastest adoption rate of the three categories, but is also most likely to be circumvented by end-users. When compared to optional and collective innovation-decisions, innovations are adopted at a slower rate, but are more likely to spread without circumvention amongst the organization. This concept has implications within the ed-tech procurement space. When districts do not involve end-users in procurement practices, but

rather, authoritatively require an innovation/tool be adopted, end-users are likely to quickly adopt the tool, but may not utilize it to fidelity. When districts employ optional or collective innovation-decision processes, where end-users have involvement in the decision-making process, it may take longer for full end-user adoption, but end-users are more likely to use products with fidelity over time.

Limitations

Although a robust mixed methodological approach was used to examine the research questions and subsequently evaluate the intervention, several limitations to the study exist. The study's case study approach, with the lack of treatment and control groups, resulted in an inability for the researcher to make causal statements about the findings (Creswell & Plano Clark, 2011). A quasi-experimental research approach may have provided for a more robust process for reducing threats to validity (Shadish et al., 2002).

Although the researcher randomly selected sites for implementing and evaluating the intervention, principals were first asked to volunteer their school for the study. While the random selection of school sites likely reduced some threats to validity (Shadish et al., 2002), selection bias existed and the research population may not accurately reflect the general population of all schools within the district, reducing the generalizability of the study's findings. Further, the snowball sampling approach used to elicit teacher participants from each school also provides a source of sampling bias. In this way, principals were asked to provide a list of potential teachers who were contacted by the researcher to volunteer for the study. The principal's selection of research participants within their school is a potential threat to validity. A randomized selection process for choosing participants with the school would mitigate additional threats to validity (Shadish et al., 2002).

Although the research study did employ a multi-site research approach that increased the study's generalizability (Creswell & Plano Clark, 2011), all schools were located within the same governing school district. The school district is well-known for its innovative one-to-one technology initiative and emphasis on using ed-tech tools, for which it is only one of eight within North Carolina. For of this reason, the end-users experience with ed-tech tools and procurement is likely heightened when compared to teachers and principals in surrounding districts. Because of this difference in population, end-users' existing perceptions could be skewed. A larger study of multiple districts would likely mitigate this issue of generalizability (Shadish et al., 2002).

The study also contained a relatively small sample size of eleven teachers and three principals. This small sample size could potentially lead to issues in reliability, variability, and low statistical power. Overall, the small sample size increases the probability that the findings were due to chance or influenced by participant biases. Increasing both the number of teacher and principal participants could mitigate the aforementioned issues.

Another area for bias was the researcher's position within the district and the researcher's role in delivering the intervention. The researcher was formerly the director of innovation within the district and worked closely with technology, ed-tech tools, and procurement. This relationship with ed-tech and with the district's principals and teachers could provide potential bias as research participants completed the intervention components and perception questionnaires. Through the delivery of the intervention, participants worked closely with the researcher and their perceptions of the intervention components could be bias to provide positive feedback due to the relationship with the researcher. To mitigate this potential bias, the intervention should be delivered by third-party individuals who are familiar with the intervention components but not part of the research group.

Future Research Recommendations

This study sough to examine the effectiveness of the intervention among end-users of ed-tech products within one school district. To fully understand the effectiveness of the intervention and potential utilization within the educational sector, additional research should be conducted. In the following sections several recommendations for future research are explored.

Multi-district, large scale study. The study's sample size of 11 teachers and three principals reduces the study's overall generalizability and transferability to other populations. To understand the intervention's impact on educators, at a broader level, a multi-district, large-scale study of the intervention's effectiveness could be conducted. A multi-district approach should include varying types of districts with regard to knowledge of procurement practices, teacher involvement, and usage of ed-tech products. Establishing a larger group of diverse districts, schools, and teachers could provide a better understanding of the intervention's effectiveness.

Long-term implications of the intervention. Due to the constraints of the research window and the applied dissertation format, only short-term outcomes were examined. However, an understanding of the intermediate and long-term outcomes could prove valuable in understanding the intervention's overall effectiveness. The intermediate and long-term outcomes are expected to become measurable after educators have significant time to implement procurement strategies within their class and school and are subject to procurement opportunities provided at the school and district level. Potential intermediate outcomes that could be examined in future research include: (a) an increase in the number of ed-tech products procured with students' needs as a central element of procurement, (b) an increase in the number of end-users involved in conducting needs assessments, (c) an increase in the number of products procured using needs assessments that emphasize student needs and end-user feedback, and (d) an increase in the continued use of ed-tech programs rather than brief usage and subsequent non-use. The

long-term outcome for the intervention could be an increase in student achievement due to the acquisition of products that met student needs. To fully evaluate the intervention a long-term research study is required. A longitudinal, year-long, study could provide data on each of the intermediate outcomes, although a multi-year study would be required to address the long-term outcome of student achievement.

Impact of the intervention on principals. Due to the small sample size of principals within the study, few conclusions can be drawn about how, individually, principal's practices change as a result of the intervention. Because principals have the responsibility of maintaining and allotting funding throughout the school, they play a vital role in the procurement process. Several teachers revealed that they were only involved in procurement practices when their principal asked them to participate. Therefore, the involvement of teachers in procurement practices may be predicated on principal's beliefs that teacher involvement is important. The intervention seeks to provide strategies for both administrators and teachers to increase teacher involvement in procurement practices. Because of this, future studies could examine the specific behaviors of principals prior to and following exposure to the intervention to understand if the intervention changes their involvement of teachers in procurement practices. Because principals are often the gatekeepers of committees and funding, understanding the role principals play in ensuring teacher's involvement in needs assessments and procurement practices could establish whether the intervention is more suited for both teachers and principals or principals alone.

Conclusion

The overall goal of this dissertation was to address the underlying issues related to the emerging field of K-12 ed-tech procurement. The study examined the experiences of 14 end-users who participated in an intervention for the POP. The study findings revealed that participants experienced high engagement and satisfaction with the intervention components.

Subsequently, end-users gained knowledge surrounding how to conduct needs assessments and procure ed-tech products. Participants also indicated an increased likelihood of future involvement in procurement practices and conducting needs assessments. Finally, end-users perceptions and attitudes toward overall procurement practices were enhanced.

As it relates to the POP and underlying factors, the intervention appears to solve for several factors and could be used within schools and districts to increase end-user knowledge of procurement practices and involvement. These results have implications across the country as the ed-tech market continues to expand and new ed-tech tools make their way into classrooms. Having a robust ed-tech procurement strategy that heavily weights end-users' voices and opinions has the ability to increase teacher efficacy and the usage of digital resources. However, more importantly, it has the ability to ensure ed-tech tools are utilized in classrooms and meet the learning needs of all students.

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Appendix A

Needs Assessment Participant Online Questionnaire Consent Form

Online Consent Form – First page of Survey Monkey Program

PLEASE READ THE FOLLOWING CONSENT FORM
USE THE BUTTONS AT THE BOTTOM OF THIS PAGE TO INDICATE YOUR CONSENT

The purpose of this survey is to determine the experiences and perceptions of teachers and principals regarding the procurement of Ed-tech products in Rowan-Salisbury Schools. The results will be used by Johns Hopkins University doctoral students to identify the strengths, weaknesses, and directions needed for improvement in Ed-tech procurement practices. Thus, it is very important that you react honestly and candidly. Your responses and identity will be treated confidentially. Thank you for your participation!

Procedures: Participation in this study will involve your completion of an online survey, which will take approximately 5-10 minutes to complete.

Risks and Benefits: There are no known risks to participating in this study. Your participation will assist in identifying strengths, weaknesses, and directions needed for improvement in Ed-tech procurement. This data will help shape Ed-tech procurement practices implemented in and outside Rowan-Salisbury Schools.

Confidentiality: All of your information will be confidential. Only the researchers involved in this study will have access to the information provided by you. Your responses will only be used for purposes of the outlined research and you will not be identified in any research reports or findings. All research data will be kept in a locked office. Electronic data will be stored on the researcher's computer, which is password protected. Any electronic files will be erased and paper documents shredded, ten years after collection.

Voluntary Participation: Participation in this research is completely voluntary. You are free to decline to participate, to end participation at any time for any reason, or to refuse to answer any individual question without penalty.

Compensation: One survey participant, drawn at random, will receive a $25 Starbucks gift card for participating in the survey.

Questions: If you have any questions about this study, please contact Andrew Smith (asmit173@jhu.edu).

Agreement to Participate . . . . . .
I have read the above information and I consent to having my data included in the described research. (click 'yes' to continue; click 'no' to decline participation.)

Appendix B

Needs Assessment Interview Consent Form

Participant Code_____

Johns Hopkins University
Homewood Institutional Review Board (HIRB)

Principal and Teacher Interview Informed Consent

Title: Ed-tech Procurement Practices

Principal Investigator: Andrew Smith, Doctoral Student, Johns Hopkins University

Date: 3/14/16

PURPOSE OF RESEARCH STUDY:
The purpose of this research study is to determine the experiences and perceptions of teachers and principals regarding the procurement of Ed-tech products in Rowan-Salisbury Schools. The results will be used by Johns Hopkins University doctoral students to identify the strengths, weaknesses, and directions needed for improvement in Ed-tech procurement practices. Thus, it is very important that you react honestly and candidly. Your responses and identity will be treated confidentially. Thank you for your participation!

PROCEDURES:
Participation involves being interviewed by researchers from Johns Hopkins University. The interview will last approximately 20-25 minutes. The discussion will be audio taped to help me accurately capture your insights in your own words. The tapes will only be heard by the researcher for the purpose of this study. If you feel uncomfortable with the recorder, you may ask that it be turned off at any time.

RISKS/DISCOMFORTS:
There are no known risks to participating in this study.

BENEFITS:
Your participation will assist in identifying strengths, weaknesses, and directions needed for improvement in Ed-tech procurement. This data will help shape Ed-tech procurement practices implemented in and outside Rowan-Salisbury Schools.

VOLUNTARY PARTICIPATION AND RIGHT TO WITHDRAW:
Participation in this research is completely voluntary. You are free to decline to participate, to end participation at any time for any reason, or to refuse to answer any individual question without penalty.

COMPENSATION:
You will not receive any payment or other compensation for participating in this study.

Title: Ed-tech Procurement Practices
PI: Andrew Smith, Doctoral Student, Johns Hopkins University
Date: 3/14/16

CONFIDENTIALITY:

All of your information will be confidential. Only the researchers involved in this study will have access to the information provided by you. Your responses will only be used for purposes of the outlined research and you will not be identified in any research reports or findings. All research data will be kept in a locked office. Electronic data will be stored on the researcher's computer, which is password protected. Any electronic files will be erased and paper documents shredded, ten years after collection.

All video/audio tapes and measures will be examined by the Principal Investigator and research affiliates only (including those entities described above). No identifiable information will be included in any reports of the research published or provided to school administration.

Video or audio data of the interviews may be transcribed by an outside agent (transcriptionist), who will de-identify all transcripts by deleting all names from the transcript and only a participant number or pseudonym will be included on these transcripts.

IF YOU HAVE QUESTIONS OR CONCERNS:

If you have any questions about this study, please contact Andrew Smith (asmit173@jhu.edu).

SIGNATURES

WHAT YOUR SIGNATURE MEANS:

Your signature below means that you understand the information in this consent form.

_____

Signature of Participant **Date**

_____

Signature of Person Obtaining Consent **Date**
(Investigator or HIRB-Approved Designee)

Appendix C

Needs Assessment Teacher Questionnaire and Interview Instrument

A. Please indicate *your* involvement in the following:

1-Not at all
2-Moderately
3-Extensively

1. Identifying new ed-tech products to be implemented in your school.
2. Examining student assessment data to identify areas of needs for potential ed-tech purchases.
3. Conducting formal needs assessments (a systematic process for determining and addressing student needs, or gaps between current conditions and desired conditions) at your school to identify areas of instructional need before examining products.
4. Evaluating Ed-tech products for instructional merit and use in the classroom.
5. Purchasing products intended for school use at the district level.
6. Working with district-level staff to evaluate new ed-tech products for district implementation.
7. Providing feedback to district-level staff about ed-tech product evaluations.

B. Indicate your level of agreement or disagreement with each of the following statements:

1-Strongly Disagree
2-Disagree
3-Neutral or Undecided
4-Agree
5-Strongly Agree

8. Your opinion is valued at the school-level for ed-tech procurement processes.
9. Teachers' opinions are valued at the district-level for ed-tech procurement processes.
10. Teachers' opinions are valued at the school-level for ed-tech procurement processes.
11. You have been given opportunities to serve on ed-tech evaluation committees.
12. You are involved in the procurement process at your school.
13. You are involved in the procurement process at the district-level.
14. School procurement processes are outdated for meeting current needs.
15. School procurement processes take too much time to obtain the products needed.
16. De-centralizing school operations (increasing school autonomy) complicates purchasing.
17. My school uses pilots to identify potential ed-tech products.

C. Given your role as teacher, please indicate the frequency of the following:

1-Never
2-Rarely
3-Sometimes
4-Most of the time
5-Always

18. Use pilots (a small scale implementation of a product) to evaluate an ed-tech products value.
19. Use free-trials to evaluate an ed-tech products value.
20. Look for and evaluate new ed-tech products.
21. Use formal needs assessments (a systematic process for determining and addressing student needs, or gaps between current conditions and desired conditions) to aid in your ed-tech product search.
22. Ask other teachers for their input in ed-tech purchases.

D. Rate the degree to which you perceive each of the following individuals or groups to be involved in procurement processes at the *district-level*?

1-Not at all
2-Moderately
3-Extensively

23. Teachers
24. Principals
25. Parents
26. Students
27. Chief Academic Officer/Curriculum Director or other)
28. Business/Purchasing Director (or similar)
29. Educational Technology Director
30. School Board
31. Superintendent
32. Other _____(please specify and rate)

E. Rate the degree to which you perceive each of the following individuals or groups to be involved in procurement processes at the *school-level*?

1-Not at all
2-Moderately
3-Extensively

33. Teachers
34. Principals
35. Parents
36. Students
37. Assistant Superintendent/Curriculum Director
38. Business/Purchasing Director (or similar)
39. Instructional Technology Facilitator
40. Superintendent
41. Other _____(please specify and rate)

F. To what degree do you rely on each of the following to evaluate ed-tech *providers*?

1-Not at all

2-Moderately
3-Extensively

42. Third-party evaluation data on a provider's program
43. School technology committee
44. Internet search
45. Teacher opinion
46. Pilot programs
47. Free trials
48. References from a trusted source
49. Peer (other districts) or national reviews
50. Evidence of strong customer service
51. Having a recognized brand
52. Offering training services for end-users
53. Integration with current technology systems
54. Performance guarantees
55. Other_____ (please specify and rate)

G. (Open-Ended)

56. Please describe start to finish what ed-tech procurement looks like in your school.
57. How do you conduct needs assessments for ed-tech products at your school?
58. What ways do you discover new ed-tech products?
59. How do you evaluate the effectiveness of new ed-tech products?

Would you be willing to participate in a 20-min interview or focus group to discuss your experiences and recommendations in more detail?

___Yes

___No

Thank you for your time!

Teacher Interview Items:

1. Talk about how you are involved in district and school procurement processes.
2. What does the procurement process look like at your school?
3. How does the district involve teachers in the procurement process?
4. Talk about how you use needs assessments to guide your purchases of ed-tech products.
5. If you could make any changes to the procurement process at the school level, what would they be?
6. How often do you ask other teachers or your principal for their advice on new ed-tech purchases?
7. What methods do you use to vet new ed-tech purchases?

Superintendent Interview Items:

1. From your perspective, what does ed-tech procurement look like in Rowan-Salisbury Schools? How does what you see compare to your vision for procurement?
2. How does the district vet new ed-tech purchases?
3. What does the needs assessment process look like in Rowan-Salisbury Schools? Does it look different from the school to district-level?
4. What areas of improvement do you see for ed-tech procurement?
5. Is there anything else you would like to add about ed-tech procurement in Rowan-Salisbury Schools?

Appendix D

Frequencies of Responses and Descriptive Statistics for Teacher Questionnaire Items

Indicate *your* involvement in the following:

	Not at All (1)	(2)	Moderately (3)	(4)	Extensively (5)			
	%	%	%	%	%	N	*M*	*SD*
1. Identifying new ed-tech products to be implemented in your school.	45.76	22.03	22.03	5.08	5.08	69	2.02	1.16
2. Examining student assessment data to identify areas of needs for potential ed-tech purchases.	33.90	15.25	23.73	16.95	10.17	69	2.54	1.37
3. Conducting formal needs assessments (a systematic process for determining and addressing student needs, or gaps between current conditions and desired conditions) at your school to identify areas of instructional need before examining products.	30.51	20.34	25.42	15.25	8.47	69	2.51	1.29
4. Evaluating ed-tech products for instructional merit and use in the classroom.	40.68	25.42	16.95	10.17	6.78	69	2.17	1.25
5. Purchasing products intended for school use at the district level.	83.05	6.78	8.47	0	1.69	69	1.31	0.76
6. Working with district-level staff to evaluate new ed-tech products for district implementation.	70.69	10.34	10.34	6.9	1.72	69	1.59	1.03
7. Providing feedback to district-level staff about ed-tech product evaluations.	57.63	22.03	22.03	5.08	5.08	69	2.02	1.16

Indicate your level of agreement or disagreement with each of the following statements:

	Strongly Disagree (1)	Disagree (2)	Neutral or Undecided (3)	Agree (4)	Strongly Agree (5)			
	%	%	%	%	%	N	*M*	*SD*
8. Your opinion is valued at the school-level for ed-tech procurement processes.	11.86	16.95	32.30	30.51	8.47	69	3.07	1.13
9. Teachers' opinions are valued at the district-level for ed-tech procurement processes.	10.17	23.73	44.07	18.64	3.39	69	2.81	0.97
10. Teachers' opinions are valued at the school-level for ed-tech procurement processes.	8.47	10.17	40.68	33.90	6.78	69	3.20	1.0
11. You have been given opportunities to serve on ed-tech evaluation committees.	37.29	22.03	20.34	16.95	3.39	69	2.27	1.22
12. You are involved in the procurement process at your school.	30.51	25.42	27.12	13.56	3.39	69	2.34	1.14
13. You are involved in the procurement process at the district-level.	59.32	18.64	18.64	1.69	1.69	69	1.68	0.95
14. School procurement processes are outdated for meeting current needs.	18.64	20.34	42.37	11.86	6.78	69	2.68	1.11
15. School procurement processes take too much time to obtain the products needed.	15.25	10.17	50.85	16.95	6.78	69	2.90	1.07
16. De-centralizing school operations (increasing school autonomy) complicates purchasing.	25.42	18.64	42.37	10.17	3.39	69	2.47	1.08
17. My school uses pilots to identify potential ed-tech products.	18.97	12.07	41.38	22.41	5.17	69	2.83	1.13

Given your role as teacher, please indicate the frequency of the following:

	Never (1)	Rarely (2)	Sometimes (3)	Most of the Time (4)	Always (5)			
	%	%	%	%	%	N	*M*	*SD*
18. Use pilots (a small scale implementation of a product) to evaluate an ed-tech products value.	32.20	23.73	33.90	6.78	3.39	69	2.25	1.08
19. Use free-trials to evaluate an Ed-tech products value.	20.34	10.17	44.07	22.03	3.39	69	2.78	1.11
20. Look for ed-tech products.	13.56	8.47	44.07	23.73	10.17	69	3.08	1.12
21. Evaluate new ed-tech products.	20.69	25.86	31.03	15.52	6.90	69	2.62	1.17
22. Use formal needs assessments (a systematic process for determining and addressing student needs, or gaps between current conditions and desired conditions) to aid in your ed-tech product search.	27.59	20.69	29.31	15.52	6.90	69	2.53	1.23
23. Ask other teachers for their input in ed-tech purchases.	20.69	20.69	27.59	22.41	8.62	69	2.78	1.25

Rate the degree to which you perceive each of the following individuals or groups to be involved in procurement processes at the *district-level*?

	Not at All (1)	(2)	Moderately (3)	(4)	Extensively (5)			
	%	%	%	%	%	N	*M*	*SD*
24. Teachers	26.79	42.86	25.00	0	5.36	69	2.14	0.99
25. Principals	0	16.07	46.43	19.64	17.86	69	3.39	0.96
26. Parents	54.55	30.91	12.73	0	1.82	69	1.64	0.84
27. Students	56.36	29.09	12.73	0	1.82	69	1.62	0.84
28. Chief Academic Officer/Curriculum Director or other)	1.79	7.14	25.00	28.57	37.50	69	3.93	1.03
29. Business/Purchasing Director (or similar)	1.79	12.50	30.36	21.43	33.93	69	3.73	1.11
30. Educational Technology Director	1.79	1.79	12.50	28.57	55.36	69	4.34	0.89
31. School Board	5.36	25.00	33.93	16.07	19.64	69	3.20	1.17
32. Superintendent	0	3.57	10.71	26.79	58.93	69	4.41	0.82

Rate the degree to which you perceive each of the following individuals or groups to be involved in procurement processes at the *school-level*?

	Not at All (1)	(2)	Moderately (3)	(4)	Extensively (5)			
	%	%	%	%	%	N	*M*	*SD*
33. Teachers	12.73	27.27	45.45	5.43	9.09	69	2.71	1.06
34. Principals	1.82	0	10.91	29.09	58.18	69	4.42	0.82
35. Parents	41.82	38.18	18.18	0	1.82	69	1.82	0.85
36. Students	40.00	36.36	20.00	1.82	1.82	69	1.89	0.91
37. Assistant Superintendent/Curriculum Director	3.70	5.56	25.93	31.48	33.33	69	3.85	1.06
38. Business/Purchasing Director (or similar)	10.91	18.18	27.27	18.18	25.45	69	3.29	1.32
39. Instructional Technology Facilitator	1.82	3.64	30.91	27.27	36.36	69	3.93	0.99
40. Superintendent	5.45	9.09	27.27	16.36	41.82	69	3.80	1.23
33. Teachers	12.73	27.27	45.45	5.43	9.09	69	2.71	1.06

To what degree do you rely on each of the following to evaluate ed-tech *providers*?

	Not at All (1)	(2)	Moderately (3)	(4)	Extensively (5)			
	%	%	%	%	%	N	*M*	*SD*
41. Third-party evaluation data on a provider's program	23.64	21.82	41.82	7.27	5.45	69	2.49	1.09
42. School technology committee	17.86	14.29	42.86	16.07	8.93	69	2.84	1.16
43. Internet search	0	23.21	50.00	17.86	8.93	69	3.13	0.87
44. Teacher opinion	5.36	1.79	42.86	30.36	19.64	69	3.57	1.0
45. Pilot programs	8.93	19.64	32.14	26.79	12.50	69	3.14	1.14
46. Free trials	10.71	8.93	37.50	30.36	12.50	69	3.25	1.12
47. References from a trusted source	1.79	5.36	37.50	42.86	12.50	69	3.59	0.84
48. Peer (other districts) or national reviews	1.79	12.50	37.50	39.29	8.93	69	3.41	0.88
49. Evidence of strong customer service	5.36	25.00	42.86	17.86	8.93	69	3.00	1.00
50. Having a recognized brand	3.57	16.07	51.79	17.86	10.71	69	3.16	0.94
51. Offering training services for end-users	1.79	25.00	44.64	21.43	7.14	69	3.07	0.90
52. Integration with current technology systems	3.57	8.93	41.07	26.79	19.64	69	3.50	1.02
53. Performance guarantees	5.45	9.09	49.09	25.45	10.91	69	3.27	0.96

Appendix E

Logic Model

Inputs	Outputs		Outcomes -- Impact		
	Activities	*Participation*	*Short*	*Intermediate*	*Long*
Time to develop end-user guide/ professional development (PD) sessions, time for meeting with end-users Ed-tech procurement resources to create end-user guide Meeting space to meet with end-users and provide PD End-users who are engaged and willing to participate in procurement practices Technology to facilitate professional development Support and integration with district and school level leadership Printing services and corresponding funding to print end-user guides	*Component 1:* Development and implementation of an online and printed four-chapter end-user (educator) guide to procurement including explanation and resources for: a. Conducting needs assessments and, b. increasing involvement in procurement cycles. (Morrison et al., 2015) Participants will be issued guide two weeks prior to professional development sessions. *Component 2:* Develop 3 (1 hour) professional development sessions on end-user guide on how to increase involvement of end-users in procurement (Bailey et al., 2015; Guskey, 2002): and conducting needs assessments (Morrison et al., 2015). *To be facilitated by school-based Instructional Technology Facilitators *Component 3:* End-users will apply knowledge through mock procurement session, facilitated by principal.	*Who:* Direct Target Audience: 9 end-users (educators) and 3 principals from varying grade levels will receive the end-user guide and professional development sessions. *How:* End-users will be engaged through the intervention process as recipients of the procurement guide and training. *Why:* End-users are engaged in this model because of their interest to be a part of the ed-tech procurement process, for which they are currently not apart.	End-users' attitudes toward procurement will become more positive. End-users will be able to provide evidence that needs assessments represent the needs of their students. End-users will be able to to utilize and practice strategies within end-user guide. End-users will have an increased awareness and knowledge of proper procurement strategies in conducting needs assessments. End-users will become advocates for their active involvement in procurement practices.	Increase in ed-tech products procured with student's needs as central element of procurement. Increased involvement of end-users in conducting needs assessments. Increase in procurement cycles built on student needs and end-user feedback.	Ed-tech products will match the learning needs of students. Increased professional development offerings at the district level concerning how to properly incorporate end-users in procurement strategies. Development of ed-tech procurement protocols used within all schools in the district. * Due to nature of the intervention timeline, long term outcomes will not be evaluated.

Assumptions

End-users will read end-user guide, participate in professional development and be open to changing procurement practices.

End-user guide and 3, 1 hour, professional development sessions will be enough to ensure end-user comprehension of Ed-tech procurement best-practices.

End-users are not versed in proper procurement strategies.

No matter teaching experience level, end-users will be equally likely to comprehend proper procurement strategies delivered through end-user guide and professional development.

End-users will be willing to try newly developed procurement strategies on mock procurement simulations.

Participants will want to learn new procurement strategies.

Participants will understand the current realities of ed-tech procurement.

Principals and district leaders' willingness to listen to the needs of end-users.

External Factors

End-users' lack of desire to learn procurement strategies.

End-user lack of reading end-user guide and participating in professional development.

Mock procurement cycle may not provide evidence of applied learning from procurement guide and professional development.

Lack of school level leadership buy-in and poor attitude toward end-user focused procurement.

The lack of stakeholder buy-in and understanding of the intervention's worth. If educators are not involved within the process of reform, they are not likely to engage and champion the initiative.
Leaders are unwilling to listen to end-user opinions.

Lack of participation and engagement with the end-user guide and corresponding professional development. If end-users do not fully participate and comprehend the steps to proper procurement, the intervention will have not been successful.

Situation/Priorities:

- End-users of ed-tech tools (educators) do not understand proper procurement strategies.
- Educators are not involved in procurement practices.
- Ed-tech products do not meet the learning needs of students.

Appendix F

Fidelity Indicators: Data Collection Matrix

Fidelity Indicator	Data Source(s)	Data Collection Tool	Frequency	Responsibility
Receiving the end-user guide.	Participants will sign off on a "documents received" sheet that indicates they received the end-user guide.	Participant sign off sheet	Data collection will occur as participants receive their end-user guides.	The researcher will be responsible for delivering the end-user guide and collecting signatures.
Attendance at professional development sessions	Sign in sheets will be used to gather data surrounding attendance at each of the professional development sessions.	Sign-in sheets	Attendance will be collected at each of the 3 professional development sessions.	Sign-in sheets will be monitored by the researcher.
Participant Engagement	Participant interviews and intervention end-user perceptions questionnaire.	Participant interviews and intervention end-user perceptions questionnaire.	Following all intervention components	The researcher will be responsible for gathering data via collection tools.

Appendix G

Data Analysis Summary

Construct Variable	Operational Definition
Independent Variables	
Participation: Participation in professional development on how to properly procure ed-tech tools.	End-users attend and actively participate in required professional development sessions on how to increase involvement in procurement practices and conducting needs assessments.
Skill set: Exposure to end-user guide to proper procurement strategies.	End-users read and comprehend how to properly conduct needs assessments. (Morrison et. al, 2014; Morrison et al., 2015)
Construct Variable	**Operational Definition**
Dependent Variables	
Participation: Involvement of end-users in proper procurement strategies.	Involvement in procurement practices is defined as: end-users' participation in each step of procurement, actively advocating for inclusion in procurement practices, and level of involvement in conducting needs assessments (Sugar et al., 2004; Rogers, 2003)
Skill Set: Ability of end-users to properly conduct needs assessments for new products.	An end-users' ability to conduct a needs assessment on the needs of students and determining gaps in needs (Morrison et al., 2011; Morrison et al., 2015).
Perception and Attitude: Perceptions and attitudes of end-users toward the intervention components.	An end-user's feedback on the intervention's various components and any changes in perception and/or attitude of ed-tech procurement practices.

Appendix H

Questionnaire, Knowledge Assessment, and Interview Instruments

Teacher Pre-Questionnaire

Closed-Ended Questions:

Attitude:
(Very Unfavorable, Unfavorable, Neutral/Unable to Judge, Favorable, Very Favorable)

1. How would you describe your attitude toward needs assessments?
2. How would you describe your attitude toward product discovery?
3. How would you describe your attitude toward product evaluation?
4. How would you describe your attitude toward overall procurement practices?

Involvement:
(Very Frequently, Frequently, Occasionally, Rarely, Never)

1. How often are you asked to participate in the purchasing processes of ed-tech tools at your school?
2. How often do you use a needs assessment to purchase new ed-tech products?

(Very Likely, Somewhat likely, Not Likely)

1. How likely are you to request involvement in procurement practices at your school?
2. How likely are you to use a needs assessment to purchase new ed-tech products?

Perception:
(Strongly Agree, Agree, Undecided, Disagree, Strongly Disagree)

1. Needs assessments represent the needs of students.
2. Needs assessments can help ensure that ed-tech products match the needs of students.

Teacher Post-Questionnaire

Closed-Ended Questions:

Attitude:
(Very Unfavorable, Unfavorable, Neutral/Unable to Judge, Favorable, Very Favorable)

1. How would you describe your attitude toward needs assessments?
2. How would you describe your attitude toward product discovery?
3. How would you describe your attitude toward product evaluation?
4. How would you describe your attitude toward overall procurement practices?

Perception:
(Strongly Agree, Agree, Undecided, Disagree, Strongly Disagree)

1. Needs assessments represent the needs of students.
2. Needs assessments can help ensure that ed-tech products match the needs of students.

Intervention Perception:

(Strongly agree, Agree, Undecided, Disagree, Strongly Disagree)

1. The end-user guide and professional development increased my knowledge of procurement practices.
2. The end-user guide and professional development increased my knowledge of how to conduct a needs assessment.
3. The end-user guide and professional development increased my likelihood of involvement in procurement practices.
4. The end-user guide and professional development has changed my attitude toward procurement in a positive way.
5. The professional development engaged me.
6. The end-user guide engaged me.

Having examined the end-user guide (iBook) and attended the professional development sessions, rate the following statements.
(Very Likely, Somewhat likely, Not Likely)

1. How likely are you to request involvement in procurement practices at your school?
2. How likely are you to use a needs assessment to purchase new ed-tech products?

Open-Ended Questions:

What could have made the end-user guide more useful or engaging?
What could have made the professional development more useful or engaging?

Principal Pre-Questionnaire

Closed-Ended Questions:

Attitude:
(Very Unfavorable, Unfavorable, Neutral/Unable to Judge, Favorable, Very Favorable)

1. How would you describe your attitude toward needs assessments?
2. How would you describe your attitude toward product discovery?
3. How would you describe your attitude toward product evaluation?
4. How would you describe your attitude toward overall procurement practices?

Involvement:
(Very Frequently, Frequently, Occasionally, Rarely, Never)

1. How often do you ask teachers to participate in the purchasing processes of ed-tech tools at your school?
2. How often do you use a needs assessment to purchase new ed-tech products?

(Very Likely, Somewhat likely, Not Likely)

1. How likely are you to involve teachers when you want to purchase a new product?
2. How likely are you to use a needs assessment to purchase new ed-tech products?

Perception:
(Strongly Agree, Agree, Undecided, Disagree, Strongly Disagree)

1. Needs assessments represent the needs of students.

2. Needs assessments can help ensure that ed-tech products match the needs of students.

Principal Post Questionnaire

Closed-Ended Questions:

Attitude:
(Very Unfavorable, Unfavorable, Neutral/Unable to Judge, Favorable, Very Favorable)

1. How would you describe your attitude toward needs assessments?
2. How would you describe your attitude toward product discovery?
3. How would you describe your attitude toward product evaluation?
4. How would you describe your attitude toward overall procurement practices?

Perception:
(Strongly Agree, Agree, Undecided, Disagree, Strongly Disagree)

1. Needs assessments represent the needs of students.
2. Needs assessments can help ensure that ed-tech products match the needs of students.

Intervention Perception:
(Strongly agree, Agree, Undecided, Disagree, Strongly Disagree)

1. The end-user guide and professional development increased my knowledge of procurement practices.
2. The end-user guide and professional development increased my knowledge of how to conduct a needs assessment.
3. The end-user guide and professional development increased my likelihood of involvement in procurement practices.
4. The end-user guide and professional development has changed my attitude toward procurement in a positive way.
5. The professional development engaged me.
6. The end-user guide engaged me.

Having examined the end-user guide (iBook) and attended the professional development sessions, rate the following statements.
(Very Likely, Somewhat likely, Not Likely)

1. How likely are you to request involvement in procurement practices at your school?
2. How likely are you to use a needs assessment to purchase new ed-tech products?

Open-Ended Questions:

What could have made the end-user guide more useful or engaging?
What could have made the professional development more useful or engaging?

Pretest - Posttest Knowledge Assessment

1. Which of the following represents the correct order for conducting procurement practices?

A. Discover new ed-tech tools, conduct needs assessment, evaluate products, purchase product.
B. Conduct needs assessment, discover new ed-tech tools, evaluate products, purchase product.

C. Discover new ed-tech tools, evaluate products, conduct needs assessment, purchase product.
D. Discover new ed-tech tools, allocate funds, evaluate products, purchase product.

2. A school is considering purchasing a new ed-tech product to increase collaboration among students. Which of the following steps should take place first in the procurement process of this new ed-tech tool?

A. Discovering products that increase collaboration amongst students.
B. Conducting a needs assessment
C. Piloting several products that claim to increase collaboration amongst students.
D. Asking for demo site licenses for teachers to explore the tool.

3. Open-ended question: You have been tasked with finding a new ed-tech product for your school. Please describe the process you would use to properly procure this new product.

4. Match the following procurement phases with their proper description.

A. Purchasing and Acquisition Phase	1. Examining budgets to determine potential areas for expenditures.
B. Discovery Phase	2. Developing a tool that uses data and other metrics to examine problems or gaps.
C. Evaluation Phase	3. Using data to determine which products fits needs.
D. Funding Phase	4. Using data from pilots to determine a final product that fits instructional needs.
E. Needs Assessment Phase	5. Selecting several potential solutions to pilot within small groups.

5. Open-ended question: Why would it be important to include educators in the procurement process?

6. Predict what is least likely to occur if educators are involved in the procurement practices and needs assessment process?

A. Educators will use products with higher efficacy.
B. Products will be procured at lower prices.
C. Products will be utilized more frequently.
D. Products will meet students' instructional gaps.

7. A teacher is new to their school but would like to become more involved in procurement practices in their schools. Which of the following strategies is least likely to increase their meaningful involvement in procurement practices?

A. Conducting a needs assessment to determine instructional gaps in students' knowledge and presenting data to their principal.
B. Discussing with the principal the possibility of joining a digital product advisory committee.
C. Attending a principal's required professional development sessions on a new ed-tech tool.
D. Volunteering to pilot new products within their classroom.

8. Open-ended question: You are asked by your principal to develop a new process for identifying needs and discovery products at your school. Currently, your procurement process includes ensuring funding is available, asking teachers what tools they want for their students, and then purchasing tools based upon majority vote of the School Improvement Team. How would you improve this process to include best-practices in procuring new ed-tech tools?

9. Which of the following is least likely to provide evidence that needs assessments represent the needs of students?

A. Data from relevant test scores
B. Data on student racial and ethnic demographics
C. Interview data from students
D. Observational data from students

10. Which of the following most closely describes a needs assessment?

A. A tool for identifying the problem and then selecting an appropriate intervention.
B. A process of reviewing interventions based upon collected student data.
C. An instructional practice that is used to collect student data to justify current intervention strategies.
D. A tool that is used by administrators to holistically determine how best to allocate funds based upon determined needs.

11. Open-ended question: A teacher believes a student need exists around addition and subtraction in their classroom. She would like to discuss purchasing a new ed-tech product that helps students strengthen their addition and subtraction skills. The teacher decides to conduct a needs assessment to ensure a need truly does exist. What process for conducting the needs assessment should she utilize?

12. Open-ended question: From the previous question, what type of data would you suggest the teacher use to conduct the needs assessment?

Interview Questions

Teacher Interview Items:

1. Talk about how you were involved in district and school procurement processes before the end-user guide and professional development. How do you see your involvement changing, if at all, after attending this professional development?
2. Talk about how you used needs assessments to guide your purchases of ed-tech products before this training. How do you see your use of needs assessments changing, if at all, after attending this professional development?
3. How has your description of procurement and needs assessments changed, if at all, since the beginning of this training?
4. After having completed this training, how do you see yourself using needs assessments to guide your purchases of ed-tech tools?

5. How do you think the end-user guide and professional development will help you identify student needs?
6. How, if at all, has the end-user guide and professional development increased your likelihood of being involved in procurement practices?
7. How likely are you to use the information you gained through this experience in your job?
8. To you, what does proper procurement of ed-tech tools look like in an ideal world? Has your opinion changed since this training?
9. Now that you have been through this process, how has your attitude toward procurement changed, if at all?
10. What are your honest thoughts and opinions of the end-user guide and professional development?
11. Describe your engagement level with the end-user guide and professional development.

Principal Interview Items:

1. Talk about how you were involved in district and school procurement processes before the end-user guide and professional development. How do you see your involvement changing, if at all, after attending this professional development?
2. Talk about how you used needs assessments as a principal to guide your purchases of ed-tech products before this training. How do you see your use of needs assessments changing, if at all, after attending this professional development?
3. How has your description of procurement and needs assessments changed, if at all, since the beginning of this training?
4. After having completed this training, how do you see yourself using needs assessments to guide your purchases of ed-tech tools?
5. How do you think the end-user guide and professional development will help you identify student needs?
6. How, if at all, has the end-user guide and professional development increased your likelihood of being involved in procurement practices?
7. How, if at all, do you think the end-user guide and professional development has increased your teachers' likelihood of being involved in procurement practices?
8. How likely are you to use the information you gained through this experience in your job?
9. Now that you have been through this process, how has your attitude toward procurement changed, if at all?
10. What are your honest thoughts and opinions of the end-user guide and professional development?
11. Describe your engagement level with the end-user guide and professional development.

Appendix I

End-User Guide

Because the district's preferred teacher device were iPad and Macbook Airs, the intervention was designed using iBooks Author and delivered through the iBooks application. A downloadable copy of the iBook can be found at: https://drive.google.com/file/d/1t-6cyw_lVZXgIW841de5emP0pT9iyHTw/view?usp=sharing. The figures below are representative of what is found within the end-user guide iBook.

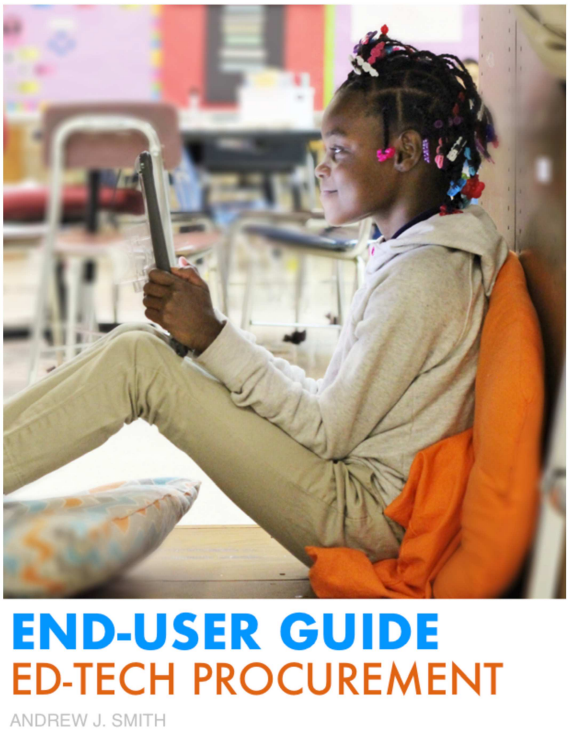
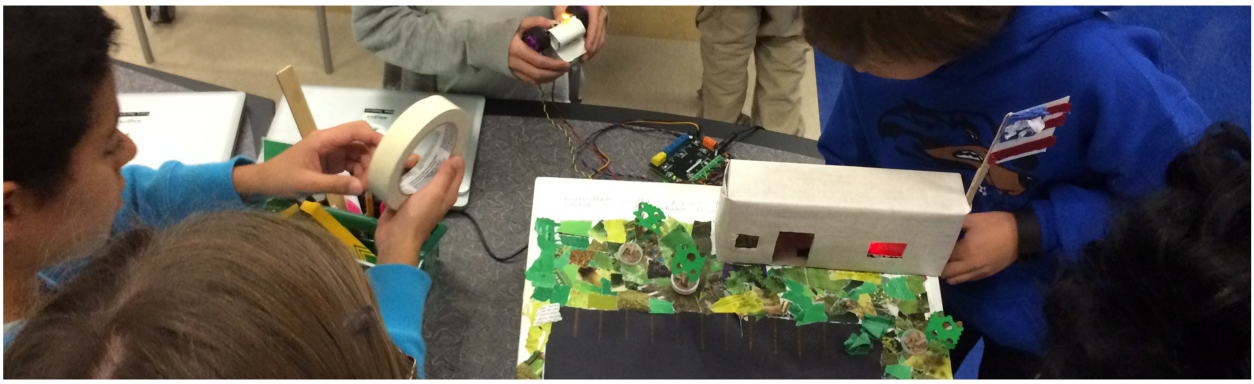


Figure I.1. End-user guide cover page.



WHAT IS ED-TECH?

Educational technologies, also known as “ed-tech”, sit at the confluence of instructional practices and technology. Over the past three decades, technology has slowly impacted almost every facet of everyday life. However, schools and teachers were slow to adopt these new technologies. With the advent of the Apple Inc. computer, private citizens saw the possibilities of computers in their homes and possibly schools. Much has changed since 1984, including the invention of the iPhone, iPad, and much more. Now, the debate is not about whether technology has a role in schools, its become how should technology be used. The business sector has similarly embraced this idea and thousands of start-ups now provide niche products varying from coding to communication apps. Start-ups are not the only companies taking notice to the educational market place of ed-tech. Big names in education, formally known in the textbook market, have drastically changed their business model to support digital age instruction. Ed-tech has a valued place in education and it is used to support educators in their mission to instruct students for a digital-age.

Students utilize an educational technology coding program, Raspberry Pi, in a problem-based learning challenge.

ISTE Standards: Preparing students for the digital age.

ISTE standards provide educators with a framework for purposeful and meaningful technology integration in their classrooms.

10

Figure I.2. An introduction to ed-tech. Each of the three chapters within the end-user guide provide an overview of the content to be covered as well as videos to engage readers.

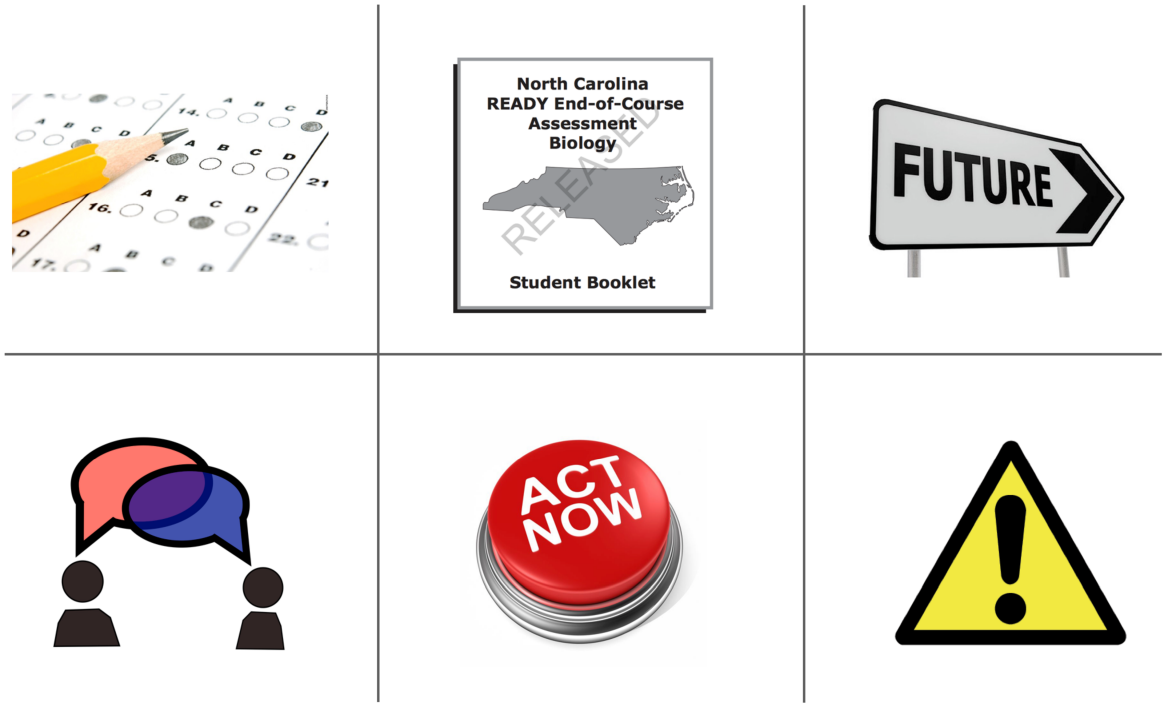


Figure I.3. An interactive feature to allow readers the opportunity to check their knowledge. This interactive feature allows readers to hover over each of the icons to learn more about each type of need.

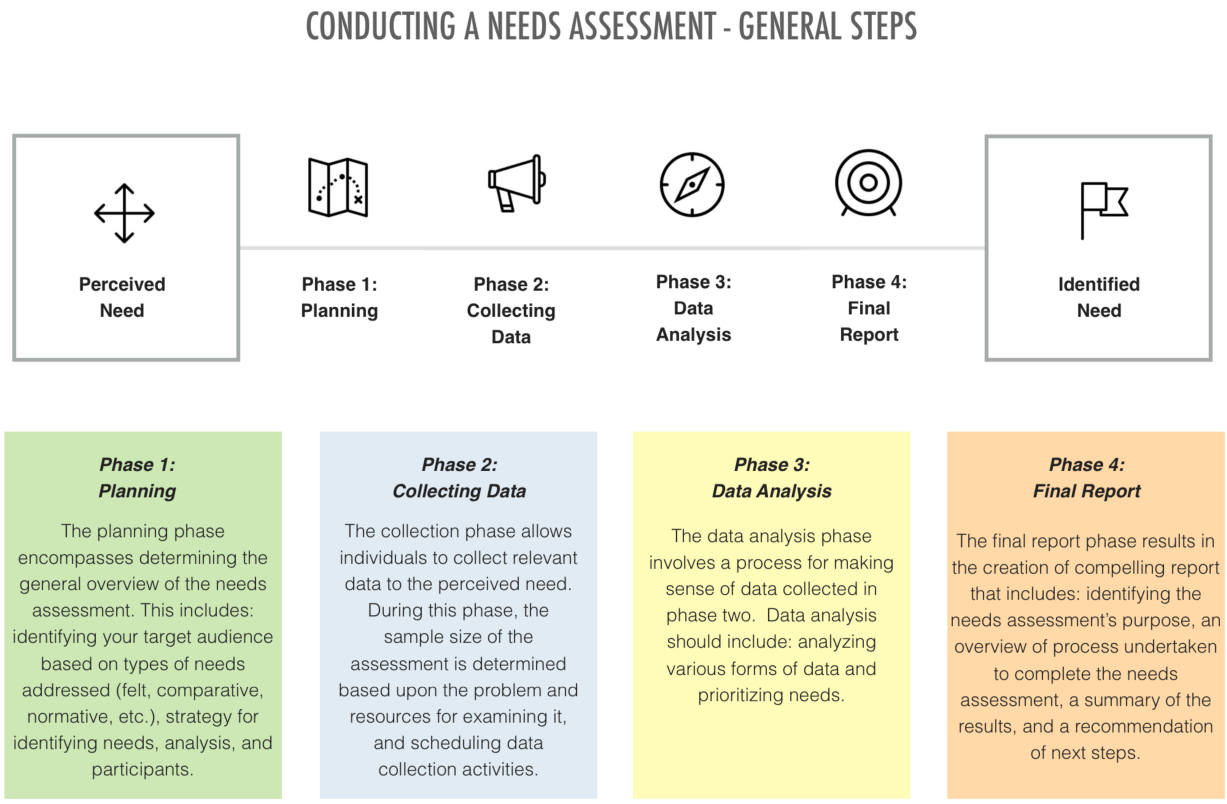


Figure I.4. Step-by-step diagram for conducting a needs assessment. This image represents the step-by-step nature of the end-user guide content. In this example, readers are lead through the process of conducting a needs assessment with subsequent pages discussing each of the various steps.

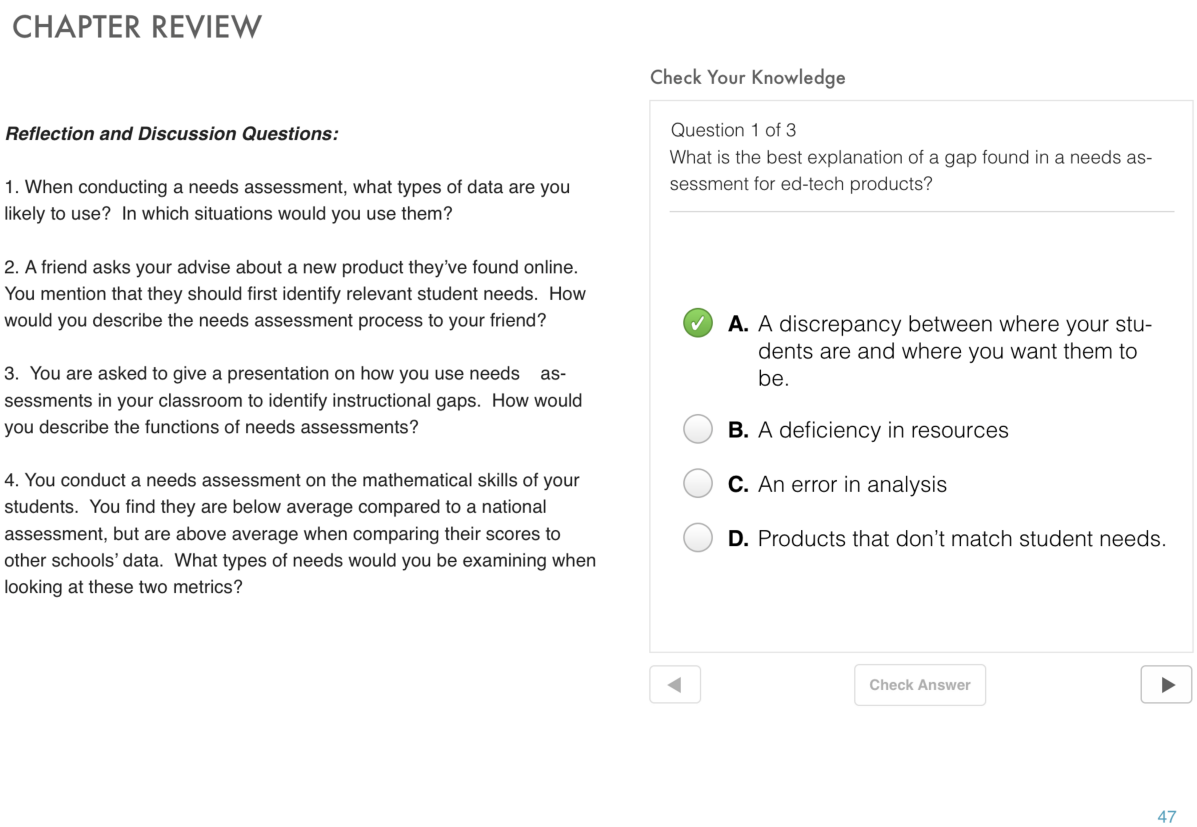


Figure I.5. Chapter review. Following each chapter within the end-user guide there is a chapter review that allows end-users to check their own knowledge through an interactive widget (right) and reflection questions for both individual and whole group discussion.

Appendix J

Professional Development Sessions and Lesson Plans

Research Intervention - Professional Development Plan (Session 1)

Learning Objectives:

- *Learners will be able identify the correct sequence of steps to proper procurement.*
- *Learners will be able to describe the phases to proper procurement.*
- *Learners will be able to recognize the phases to proper procurement.*
- *Learners will reflect on their own or school's current procurement practices compared to best-practices and articulate strategies to go from current procurement practices to best practices.*

Professional Development Components:

- Keynote Presentation
- iBook Presentation
- Exploration and discovery of resources.
- Reflection & Questions

Professional Development Timeline (1 Hour):

- Sign-in Sheet - Print
- Introduction & Sign Consent Forms (5 Mins) - Print
- Delivery of iBook and Download (5 Mins) – Email
  https://drive.google.com/file/d/1KwfO7ZXVkPIteQOegi9a0592rGtdcYTv/view?usp=sharing

- Complete Pre-Survey (10 Mins) - Email
- Presentation Keynote of Proper Procurement and iBook (25 Mins)
- Activity - Jig-saw activity on product discovery (10 mins) - Email

  Elementary
  https://docs.google.com/document/d/1gDTu9mXf_wvSYyVkh0uxfj7tRf4r8A7VMn-j9UiGpTI/edit?usp=sharing

  Middle
  https://docs.google.com/document/d/1mHYWz765UchpKAbwXh_xowTl5Y1UHr3w8ubf9lF8gEA/edit?usp=sharing

  High
  https://docs.google.com/document/d/15Ah9VTH1ysklfkLoPbNX8z1akcAeA5-FufxmJPiHJqk/edit?usp=sharing

- Reflection and Questions (5 mins)

Research Intervention - Professional Development Plan (Session 2)

Learning Objectives:

- *Learners will be able to describe the phases to proper procurement.*
- *Learners will reflect on their own or school's current procurement practices compared to best-practices and articulate strategies to go from current procurement practices to best practices.*
- *Learners will be able to recognize and articulate the importance of being involved in procurement practices and needs assessments.*
- *Learners will be able to identify appropriate strategies to advocate and increase their involvement in procurement.*

Professional Development Components:

- Review Activity
- Ed-tech RCE Demonstration
- Keynote Presentation
- Reflection & Questions

Professional Development Timeline (1 Hour):

- Sign-in Sheet - Print
- Recap of Previous Learning (10 mins) - Online
    - Kahoot! – kahoot.it - 5300328
- Evaluation of Ed-tech Products Activity (25 mins)
    - Pick Product and Demonstration RCE - https://edtechrce.org
- Increasing End-user Involvement - Keynote Presentation (20 mins)
- Reflection and Questions (5 mins)

Research Intervention - Professional Development Plan (Session 3)

Learning Objectives:

- *Learners will be able to identify sources of evidence that supports the statement that 'needs assessments represent the needs of their students'.*
- *Learners will recognize the basics of needs assessments including: what they are, how they can identify student needs, and drive purchasing decisions.*
- *Learners will be able to articulate the process of conducting needs assessments and how data is utilized.*

Professional Development Components:

- Keynote Presentation
- iBook Presentation
- Exploration of needs assessment process
- Reflection & Questions

Professional Development Timeline (1 Hour):

- Sign-in Sheet - Print
- Recap of Previous Learning (10 mins)
- Keynote Presentation on Needs Assessment (20 mins)
- Needs Assessment Worksheet (20 mins)
- Reflection and questions on three sessions (10 mins)

Ed-tech Needs Assessment Worksheet

Title of Needs Assessment:	Needs Assessment Date:
Educational Guess or Hunch on Need:	

Planning and Collecting Data

Knowledge Objectives:

Objective 1:

_____

_____

Objective 2:

_____

_____

Objective 3:

_____

_____

Types of Needs Addressed: (Check Each)

☐ Normative ☐ Felt ☐ Future

☐ Comparative ☐ Expressed ☐ Critical

Types of Needs Addressed: (Describe any checked boxes and associated data points)

Needs Assessment Participants: (Check, indicate approximate sample size and why)

☐ Student ☐ Why:_____

☐ Teacher/Staff ☐ Why:_____

☐ Administrator ☐ Why:_____

☐ Parent ☐ Why:_____

☐ Other ☐ Why:_____

Needs Assessment Instruments: (Check, indicate why, and who)

☐ Interview Why:_____ Who: _____

☐ Focus Group Why:_____ Who: _____

☐ Survey Why:_____ Who: _____

☐ Pre-Generated Data Why:_____ Who: _____

☐ Other Why:_____ Who: _____

Needs Assessment Instruments Continued: (When and how)

☐ Interview When:_____ How: _____

☐ Focus Group When:_____ How: _____

☐ Survey When:_____ How: _____

☐ Pre-Generated Data When:_____ How: _____

☐ Other When:_____ How: _____

Data Analysis

Discovered Needs: (List all needs)

Need 1: _____

Need 2: _____

Need 3: _____

Need 4: _____

Need 5: _____

Need 6: _____

Need 7: _____

Need 8: _____

Prioritized Needs: (List top 3 needs in order of most importance - 1 being most important)

Need 1: _____

Need 2: _____

Need 3: _____

Appendix K

Participant Questionnaire Frequencies and Descriptive Statistics

Rate your level of agreement to the following statements.

	Strongly disagree	Disagree	Undecided	Agree	Strongly agree			
	%	%	%	%	%	N	*M*	*SD*
The end-user guide (iBook) engaged me.	0	0	0	57.14	42.85	14	4.42	0.51
The professional development sessions engaged me.	0	0	0	14.28	85.71	14	4.85	0.36
The end-user guide and professional development has changed my attitude toward procurement in a positive way	0	0	0	35.71	64.28	14	4.64	0.49
The end-user guide and professional development increased my likelihood of involvement in procurement practices	0	0	0	42.85	57.14	14	4.57	0.51
The end-user guide and professional development increased by knowledge of procurement practices	0	0	0	0	100	14	5	0

The end-user guide and professional development increased by knowledge of how to conduct a needs assessment	0	0	0	28.57	71.42	14	4.71	0.46

Rate your level of agreement to the following statements.

	Extremely Unlikely	Unlikely	Neither Likely or Unlikely	Likely	Extremely Likely			
	%	%	%	%	%	N	*M*	*SD*
Having read the end-user guide and attended the professional development sessions how likely are you to request involvement in procurement practices at my school?	0	0	7.14	35.71	57.14	14	4.5	0.65
Having read the end-user guide and attended the professional development sessions how likely are you to use a needs assessment to purchase a new ed-tech tool?	0	0	7.14	42.85	50	14	4.42	0.64

Rate your level of agreement to the following statements.

	Never	Rarely	Occasionally	Frequently	Very Frequently			
	%	%	%	%	%	N	*M*	*SD*
How often are you asked to participate in the purchasing processes of ed-tech tools?	14.28	14.28	64.28	7.14	0	14	2.64	0.84
How often do you use a needs assessment to purchase new ed-tech products?	7.14	50	28.57	14.28	0	14	2.14	1.16

Appendix L

Author's Curriculum Vitae

EDUCATION:

Johns Hopkins University - Baltimore, Maryland Anticipated: May 2019
Doctorate of Education - Entrepreneurial Leadership in Education

Johns Hopkins University - Baltimore, Maryland August 2013
Graduate Certificate in Administration and Supervision
International Society for Technology in Education Affiliation Cohort

Wake Forest University - Winston-Salem, North Carolina
August 2009
Master of Education
Thesis Topic: Engagement Levels and Technology Integration

Wake Forest University - Winston-Salem, North Carolina May 2008
Bachelor of Arts
Major: Biology
Minor: Secondary Education

PROFESSIONAL EXPERIENCE:

Rowan-Salisbury School System (19,000 Students) October 2016 - Present
District Office
Salisbury, NC

Chief Strategy Officer

Assists the superintendent in developing, communicating, executing, and sustaining district strategic initiatives as well as fostering collaborative efforts with internal and external stakeholders. Specifically, the following has been accomplished:

- Lead and developed the district's 2017-2020 strategic plan including working with internal and external stakeholders to develop executable strategies and metrics for evaluation.
- Facilitated the district's Grand Rounding Process for continuous improvement, which includes visiting every school (35) in 6 days to gather data to inform the strategic plan and provide feedback to departmental and school-based administrators.
- Work with various district leaders and school-based leaders to develop the vision and implementation process for the district's rollout of 16 "NCDPI Restart" schools.
- Created and implemented district-wide, eight chapter, iBook for training all employees on all elements of the district's strategic plan and educators' Mindset.
- Created and implemented district-wide the Rowan-Salisbury Schools "Teacher Channel" featuring videos of instructional best-practices from expert educators within the district.

- Developed the district's homeschool strategy.
- Created the Educator's Playground to allow educators to learn through play by experiencing the latest in ed-tech tools before purchasing them.
- Active member of the district's capital needs committee for district reassignment and school closure.
- Act as Ex-facto member and liaison of the district's educational foundation - Rowan Partners for Education.

Rowan-Salisbury School System November 2013 - October 2016
District Office
Salisbury, NC

Director of Innovation

- Serve as project manager for district's 20,000 device (35 schools) 1:1 technology initiative.
    - Manage $16 million 1:1 budget.
        - Created lease agreement in concert with Chief Financial Officer and Apple Executives.
        - Implemented and managed new Learning Management System - Schoology for 20,000 students and 3,000 staff.
        - Completed refresh lease cycle of 23,000 devices in spring 2017.
    - Work with corporate partners (Apple Inc., JAMF, Aerohive) to build infrastructure and capacity.
    - Coordinate with district's 35 principals to develop laptop and iPad deployment plans, schedules and parent event nights.

- Supervise thirty-four Instructional Technology Facilitators (ITF) at thirty-five sites.
    - In 2013, petitioned Board of Education for funding to increase positions by seven individuals.
        - Increased district ITF personnel by 21% during year of reduced budgets.
    - Design professional learning experiences and professional development modules for ITFs to be replicated within each school.

- Manage district-wide professional development for 3,000 employees.
    - Develop, organize, and direct Summer Institutes on Problem Based Learning and literacy for approximately 100 district educators.
    - Coordinate annual "Back to School" conference for all certified staff members.
    - Organizing EdCamp Rowan regional EdCamp conference for RSS and surrounding district educators.
    - Manage district bi-weekly Twitter Chats on best practices in learning - #rsschat.
    - Provide professional development for school and district level administrators.
    - Coordinate and provide vendor-specific professional development for trainer the trainer models.
    - Coordinated and facilitated bringing 400 educators from Rowan-Salisbury Schools to ISTE in 2014 and 2015.

- Created and Manage "Center of Innovation - Professional Development Institute / Research and Development Institute".
    - Provide immersive and authentic learning experiences for teachers in a new 3,000 square foot state-of-the-art facility.
    - Provide digital resource repository and virtual learning experiences.
    - Pilot innovative technology with educational businesses and participating classroom teachers.
    - Oversee technology grant programs.
        - 21st Century Model Classrooms grant program.
        - Robertson Foundation grant program.

- Developed and manage district's WRSS News Broadcast Program.
    - Organize student anchors, reporters and editors to produce monthly broadcasts of district news and events.
    - Broadcasts on local cable subsidiary.
    - Received a Blue Ribbon from the NC School Public Relations Association.

- Created and implemented K-12 Digital Citizenship Curriculum
    - Teachers convened to create full K-12 digital citizenship curriculum, creating vertical and horizontal alignment of over 230 lessons for use with all 20,000 RSS students.

- Collaborate with the Board of Education on creation and adoption of policy updates and strategic plan.
    - Created new Board of Education policies on Social media, Responsible Use Policy, Cell Phone Usage, Internet Safety, and Digital Citizenship.
    - Policies now match best practices in digital age learning.

- Established community partnerships to create 100 district-wide WiFi Hotspots and homework centers.
    - Held literacy summit in September of 2014 and September of 2015 to bring together business, community and religious leaders to find innovative solutions to literacy issues.
    - Community members serve as hot-spots for students without access to Internet at home.
    - Serve as advisor to AppleSeed, a non-profit organization that provides poverty stricken students with Kindles for developing early literacy skills.

- Collaborated with Catawba University to establish and develop STEM Graduate School Master's degree.
    - Teachers are provided free tuition to the program as long as they agree to work in Rowan-Salisbury Schools for four years.

District Committee Membership:

- Superintendent's Cabinet
- Digital Conversion Committee

- Curriculum and Instruction Team
- Grow Your Own Leaders Committee
- School Calendar Committee
- Grant Committee

Catawba College June 2016 - August 2016
Department of Education
Salisbury, NC

Adjunct Professor

Instructed graduate courses in instructional design, technology integration and STEM education. Students of these courses are prepared to use technology and STEM methodologies purposefully in their science and mathematics classrooms and understand technologies' inherent value in a globally competitive 21st Century environment.

Course taught: EDUC 5113 Advanced Technology Applications for Teachers I

Wake Forest University August 2011 - August 2014
Department of Education
Winston-Salem, NC

Adjunct Professor

Instructed undergraduate and graduate courses in instructional design, assessment, methodology, professional development and technology integration. Students of these courses are prepared to use technology purposefully in their future classrooms and understand technologies' inherent value in a globally competitive 21st Century environment.

Courses taught: EDU 307 Technology in Education, EDU 717 Graduate Level Technology in Education, EDU 716 Professional Development Seminar, and EDU 764 Seminar in Curriculum and Instruction.

North Carolina Virtual Public Schools (NCVPS) January 2011 - June 2013
Raleigh, NC

Online OCS Biology Instructor

Instructed biology sections for students from high schools around North Carolina. Co-instructed and collaborated virtually with face-to-face EC educators to deliver biology curriculum to exceptional children through differentiated instruction methods that met the diverse needs of each EC student.

Rowan-Salisbury School System August 2009 - November 2013
East Rowan High School

Salisbury, NC

Biology and Forensics Instructor

Prepared regular and honors level biology students for End-of-Course exams with yearly proficiency ratings greater than 90%. Wrote curriculum for new forensics course at East Rowan High School, as well as, facilitated construction of the district high school's forensic course curriculum. Served in several leadership positions including: school improvement team chair, department chair, and student teacher mentor program. Extracurricular duties included: assistant marching band director (3 years), assistant soccer coach (4 years) and Junior Civitan advisor (4 years).

RESEARCH & SCHOLARSHIP:

Publications, Appearances, and Articles

Smith, A.J. (2008). Students experience SMART Board through constructivist values. In L.P. McCoy (Ed.) Studies in teaching: 2008 research digest (pp 19-24), Winston-Salem, NC: Wake Forest University.

DVD Appearance: (May 2010) Larry Bell's 12 Powerful Words Campaign - Closing the Achievement Gap.

Entrsekt - ISTE Quarterly Journal (October 2015) - "How to Boost Buy-in for Transformational Learning Initiatives"

Entrsekt - ISTE Quarterly Journal (December 2015) - "Be the Change: The Role of Educators in Leading Transformation"

Entrsekt - ISTE Quarterly Journal (January 2017) - "What full-scale change looks like - and how to get there."

Empowered Learner - ISTE Journal (July 2018) - "A Delicate Balance - Exploring the Relationship Between Educators and Edtech Companies"

EdTech focus on K-12 - ISTE 2015: New Trends in Ed Tech Professional Development (June 2015) https://edtechmagazine.com/k12/media/video/iste-2015-new-trends-ed-tech-professional-development

ISTE Connects - Conquer ISTE as a Team (June 2015) https://www.iste.org/explore/articleDetail?articleid=432&category=ISTE-Connects-blog&article=

ISTE Connects - No Internet at Home? Tap Into Your Community to Narrow the Digital Divide (July 2015) https://www.iste.org/explore/articleDetail?articleid=498&category=Lead-the-way&article=No+internet+at+home%3F+Tap+into+your+community+to+narrow+the+digital+divide

ISTE Connects - Keep ISTE Going All Year (August 2015)
https://www.iste.org/explore/articleDetail?articleid=503&category=ISTE-Connects-blog&article=Keep+ISTE+2015+going+all+year!

ISTE Connects - Transforming With Tech? Get Everyone on Board (October 2015)
https://www.iste.org/explore/articleDetail?articleid=566&category=Lead-the-way&article=

THE Journal - Q&A with Digital Innovator Andrew Smith (May 2016)
https://thejournal.com/articles/2016/05/10/q-and-a-with-innovator-andrew-smith.aspx

EdTech focus on K-12 - ISTE 2016: Inside a Successful EdTech Professional Development Program https://edtechmagazine.com/k12/media/video/iste-2016-inside-successful-edtech-professional-development-program

EdTech Magazine - Technology Starts with Professional Development and Training (June 2016)
http://www.edtechmagazine.com/k12/article/2016/06/technology-starts-professional-development-and-training

Tech & Learning - Digital Curriculum: Tech & Curriculum Leaders in Partnership (August 2016)
http://www.techlearning.com/resources/0003/digital-curriculum-tech--curriculum-leaders-in-partnership/70179

District Administration - Tech and Content TEAM UP (February 2017).
https://www.districtadministration.com/article/tech-content-team

EdWeek - EdWeek Market Brief – Use It or Lose It: School Schools' Spending Behavior in the Spring (March 2017)
https://marketbrief.edweek.org/market-trends/use-lose-schools-spending-behavior-spring/

EdWeek - District Leaders Offer Insights: What They Want From Companies at Conferences (April 2017)
https://marketbrief.edweek.org/k12-insider/what-district-officials-want-from-vendors-ed-tech-conferences/

EdWeek Market Brief - An Inside Scoop on What District Leaders Want From RFP Responses (August 2017). https://marketbrief.edweek.org/k12-insider/inside-scoop-district-leaders-want-rfp-responses/

ISTE Connect Learner - Edtech Playground: Helping Teachers Choose Better Tools (April 2018). https://www.iste.org/explore/articleDetail?articleid=2177

ISTE Connected Learner - Teach Digital Citizenship All Year, Every Year (April 2018).
https://www.iste.org/explore/articleDetail?articleid=2187

EdNC – The Educators' Playground: Where Teachers and Tech Come Together (July 2018). https://www.ednc.org/2018/07/10/the-educators-playground-where-teachers-and-tech-come-together/

Conference and Keynote Presentations

Prior to 2012

Conference presentations include: North Carolina Educational Technology Conference, Texas Instruments T3 Conference, North Carolina Technology in Education Society Conference, International Society for Technology in Education Conference.

2012-Present

Emerging Teacher Leader Network Conference (January 2012) Winston Salem, NC. (Keynote Address) Focus on beginning teachers, leadership and advancement in the field of education.

North Carolina Technology in Education Society Conference (March 2012) Raleigh, NC. You be the Director: Student Models of iMovie Creation in the Classroom.

Computer Using Educators Conference (March 2012) Palm Springs, CA. Using iMovie in the Classroom to Create Movie Trailers that Reach Upper Level Bloom's.

International Society for Technology in Education Conference (June 2012) San Diego, CA. Effective Models of Promethean Board (Interactive Whiteboard) use in the classroom.

North Carolina Science Teacher Association Conference (November 2012) Winston Salem, NC. iMovie in the Science Classroom.

STEM Initiative Conference (August 2012) Salisbury, NC. Interactive Technology Probes and the Science Classroom.

Computer Using Educators Conference (March 2013) Palm Springs, CA. iPads and iMovie in the Classroom.

Computer Using Educators Conference (March 2013) Palm Springs, CA. iPads and Literacy: Where technology Meets the Book.

North Carolina Technology in Education Society Conference (March 2013) Raleigh, NC. iPads and Literacy Strategies That Work.

International Society for Technology in Education Conference (June 2013) San Antonio, TX. High school Registration in a Technological World.

International Society for Technology in Education Conference (June 2013) San Antonio, TX. iPads – The New Age Film Production.

International Society for Technology in Education Conference (June 2013) San Antonio, TX. iMovie Trailers in the Classroom.

MOBILE Technology Conference (September 2013) Tucson, AZ. Merging STEM and the Common Core with Mobile Devices (Short Course).

National Science Teacher Association Conference (November 2013) Charlotte, NC. Literacy in Science Classrooms: Where iPads meet the Science Textbook.

National Science Teacher Association Conference (November 2013) Charlotte, NC. iSTEM: Using iPad's iMovie to Create Meaningful Assessments.

Florida Educator Technology Conference (January 2014) Orlando, FL. STEM Enhanced Common Core Activities for Digital Natives (Paid Short Course)

Florida Educator Technology Conference (January 2014) Orlando, FL. Literacy and iPads: Merging Text and Technology.

Guildford County Schools Administrative Conference (March 2014) Greensboro, NC. Marketing Schools with Innovative Solutions.

International Society for Technology in Education Conference (June 2014) Atlanta, GA. Revolutionize Classrooms Through Creativity - iMovie.

National School Public Relations Association (July 2014) Baltimore, MD. Public Relations for School Districts -Marketing, Learning, Collaborating.

JAMF User National Conference (October 2014) Minneapolis, MN. Lessons learned - Implementing a Large-Sized, 20,000 Student School District 1:1 in 6 months.

Regional Parent-Teacher Association Meeting (November 2014) Salisbury, NC. (Keynote Address) A Call for Change! Technology Will Transform Our Schools.

North Carolina Technology in Education Society Conference (March 2015) Raleigh, NC. Creating large scale Professional Development conferences within your district at little to no cost.

Computer Using Educators Conference (March 2015) Palm Springs, CA. Leading a district instructional transformation through a digital conversation.

International Society for Technology in Education Conference (July 2015) Philadelphia, PA. Do THIS, not THAT - Simple Answers to 1:1 Implementation Questions.

International Society for Technology in Education Conference (July 2015) Philadelphia, PA. Literacy and iPads for Dummies.

Apple Inc. What's Next Conference (December 2015) Cupertino, CA. Emerging and Innovative Trends in Technology Rich Classrooms.

North Carolina Technology in Education Society Conference (March 2016) Raleigh, NC. Turning the Pages of Personalized Learning.

International Society for Technology in Education Conference (June 2016) Denver, CO. Personalizing Every Child's Education with the iPad.

EdNET (September 2016) Dallas, TX. Speaker Panel Keynote: Ed-tech Procurement in 21st Century Schools.

The Learning Council (January 2017) Charlotte, NC. Leading Instructional Transformation in Low Performing School Districts.

North Carolina Technology in Education Society Conference (March 2017) Raleigh, NC. Take the Sting Out of Ed-Tech Procurement – Simple Strategies, Big Results.

North Carolina Technology in Education Society Conference (March 2017) Raleigh, NC. Featured Presenter - Innovative Professional Development Strategies to Engage All Educators.

ASU + GSV Conference (May 2017) Salt Lake City, UT. The New Dream Teams: How Collaboration Between School District Tech and Curriculum Teams Can Transform Teaching and Learning and Improve Student Achievement.

Apple Inc. International Tech Tour (May 2017) Washington, DC. Technology and Instruction Integration Panelist.

International Society for Technology in Education Conference (June 2017) San Antonio, TX. Innovative PD Strategies to Engage all Educators.

International Society for Technology in Education Conference (June 2017) San Antonio, TX. Take the Sting Out of Ed-Tech Procurement – Simple Strategies, Big Results.

EdSurge & Digital Promise Convening (October 2017) San Fransico, CA. Shark Tank Innovation Pitch - Educators' Playground.

EdWeek National Convening (November 2017) New Orleans, LA. Ed-tech Procurement and Purchasing Panelist.

Emerging Teacher Leader Network (January 2018) Winston Salem, NC. Keynote: Innovation in the classroom.

North Carolina Technology in Education Society Conference (March 2018) Raleigh, NC. Revitalize Your District's Professional Development.

North Carolina Association of School Administrators (April 2018) Concord, NC. Designing Innovative Professional Development Strategies to Meet the Needs of all Educators.

Professional Memberships and Board Memberships

Professional Affiliations

- International Society for Technology in Education (ISTE)
- North Carolina Technology in Education Society (NCTIES)
- North Carolina Association of School Administrators (NCASA)

- Aircraft Owners and Pilots Association (AOPA)

Regional and National Board Membership/Educational Service

- North Carolina Technology in Education Society Elected Board Member (2018-2020 Term)
- Digital Promise - League of Innovative Schools (National Think Tank)
- DigiLearn - NC Based Education Think Tank
- North Carolina Emerging Trends Network
- Apple Inc. What's Next? Research Cohort
- Future Ready Schools Cohort - US Department of Education
- Noddle Market Inc. - Advisory Council and Review Board

Grants & Awards

2018 - Johns Hopkins University Doctoral Scholarship
2018 - Digital Learning Initiative - Innovation Academy Grant ($300,000)
2018 - National School Board Association Top 10 (#4) Digital Districts in America Award
2017 - North Carolina Digital Learning Initiative Showcase Grant ($47,000).
2017 - Kenan Foundation Grant ($150,000) for Personalized/Blended Learning Model Classrooms
2017 - The Learning Counsel - Honorable Mention - National "Top Digital District"
2017 - Johns Hopkins University Doctoral Scholarship
2017 - National School Board Association/COSN "20 to Watch" Award
2017 - National School Board Association Top 10 (#7) Digital Districts in America Award
2016 - NC School Board Association - Excellence in Educational Programs Award
2016 - The Learning Counsel - National Digital Curriculum Strategy Award
2016 - White House Invited Guest - Redesigning Next Generation High Schools
2016 - Center for Digital Education - National Distinguished Curriculum Creation Award
2016 - T-Mobile Digital Learning Grant - Supplies 300 at-risk students with free MiFi for home use
2015 - Johns Hopkins University Doctoral Scholarship
2014 - EdSurge & Digital Promise's Digital Innovation in Learning Award - Honorable Mention
2014 - NC School Public Relations Association Blue Ribbon Award - School Marketing Campaign
2014 - Digital Learning Grant - $70,000 (Sent 120 teachers and administrators to ISTE in Atlanta, GA)
2013 - Apple Inc. Distinguished Program Award (2013-2015)
2013 - US Department of Education Project Unify Grant Awardee ($4,000)
2012 - North Carolina District Junior Civitan Advisor of the Year
2012 - North Piedmont Conference Assistant Coach of the Year
2012 - International Society for Technology in Education Young Educator Award Nominee
2012 - iPad Grant Awardee ($35,000)
2011 - RSS Teacher of the Month
2011 - STEM Biotechnology Grant Initiative Awardee ($20,000)
2010 - Crystal Apple - Excellence in Teaching Award
2010 - Model 21st Century Classroom Grant Awardee ($100,000)

2008 - Master Teacher Fellowship (MTA): Full Scholarship and Stipend ($50,000) at Wake Forest

ENDORSEMENTS:

North Carolina

State Board of Education
Principal Licensure
Expiration: August, 2022

North Carolina

State Board of Education
Comprehensive Science Licensure
Expiration: August, 2022